B.2 ALTERNATIVES

Testimony of Suzanne Phinney, D.Env.

B.2.1 SUMMARY OF CONCLUSIONS

In this analysis of the Ridgecrest Solar Power Project, 26 alternatives have been developed and evaluated in addition to the proposed project. These include three modifications of the project at the proposed site, the no project/no action alternative, five alternative site locations, a solar photovoltaic facility at the proposed site, a range of solar and renewable technologies, generation technologies using different fuels, and conservation/demand-side management.

Of the 26 alternatives, four alternatives were determined to be reasonable by the Bureau of Land Management and feasible by the Energy Commission and have the potential to result in reduced impacts in comparison with the proposed project: the Northern Unit Alternative, the Southern Unit Alternative, the Original Proposed Project Alternative, and the No Project/No Action Alternative. The Bureau of Land Management would consider four alternatives including alternatives to issuance of the land use plan amendment.

Of the three modifications at the RSPP site, the Northern Unit Alternative and the Southern Unit Alternative would reduce impacts in comparison to the proposed project but would still result in significant adverse impacts to biological resources that cannot be mitigated. These alternatives would meet most of the project objectives (although reducing the generation capacity), but would not attain the purpose and need for the project. The Original Proposed Project Alternative would meet project objectives and the purpose and need for the project but would increase impacts in comparison to the proposed project.

Energy Commission staff considers the No Project/No Action Alternative to be superior to the proposed project. While it would eliminate the potential for 250 MW of additional solar thermal power created using parabolic trough technology at the Ridgecrest Solar Power Project site and thus not meet project objectives, it would eliminate significant immitigable visual and biological resource impacts associated with the proposed project. New renewable resources may be developed to meet the State's Renewables Portfolio Standard (RPS) requirements in the absence of the Ridgecrest Solar Power Project.

The Garlock Road Alternative site is evaluated in detail by the Energy Commission under the California Environmental Quality Act only. While the impacts of this site would be similar to those of the proposed site in many disciplines, this site would have less severe biological impacts because the Garlock Road site does not contain the unique ecology found on the project site that allows for denser plant growth and high concentrations of desert tortoise. The Garlock Road site does not provide a primary means for Mohave ground squirrel populations to maintain genetic connectivity; however, the site may serve as a connector for wildlife to areas of high quality habitat. The site is potentially available but flooding in the area may affect the feasibility of locating a project at the Garlock Road Alternative site. Transmission interconnection may be difficult because sensitive biological areas occur along the right of way.

Impacts of a solar PV facility at the proposed project site would depend on the degree of grading required; reduced need for grading would reduce impacts to biological resources. However, more land would be required to provide the same power output. Modified fencing, if used, may permit movement of desert tortoises. Less grading would also reduce cultural resource impacts. Impacts to water use during operations would be substantially reduced. Visual impacts would be reduced due to shorter components of a PV facility. Impacts to recreation and wilderness would be similar.

The four other alternative sites (Alabama Hills, Boron, South of California City and Ridgecrest Landfill) would not substantially reduce impacts and the feasibility of developing projects at these locations is reduced because of size limitations, past operations and private ownership.

All offsite alternatives are considered unreasonable by the Bureau of Land Management because, as discussed below, none would accomplish the purpose and need for the proposed action.

Alternative solar thermal technologies (solar power tower, Stirling dish and linear Fresnel) are also evaluated. As compared with the proposed parabolic trough technology, these technologies would not substantially change the severity of visual impacts, biological resources impacts and cultural impacts, though land requirements vary among the technologies. Distributed generation solar photovoltaic facilities (i.e., photovoltaic panels placed on surfaces such as rooftops and parking lots) would likewise require extensive acreage, although they would minimize the need for undisturbed open space. However, increased deployment of distributed solar photovoltaic technology faces challenges in manufacturing capacity, cost, and policy implementation.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) are also examined as possible alternatives to the project. These technologies would either be infeasible at the scale of the Ridgecrest Solar Power Project, or they would create their own significant adverse impacts in other locations. For example, a natural gas plant would use substantially less land and avoid cultural and biological resources impacts, but it would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law and such a facility would require large quantities of cooling water.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that would be served by the Ridgecrest Solar Power Project. In addition, these programs would not provide the renewable energy required to meet the California RPS requirements.

Staff's analysis of renewable energy technology options indicates that contributions from each commercially available renewable technology will be needed to meet California's RPS requirements and to achieve the statewide RPS target for 2020 (between 45,000 gigawatt-hours to almost 75,000 gigawatt-hours according to the 2009 Integrated Energy Policy Report). Wave and tidal technologies are not yet commercially available in the United States. Therefore, the combined contribution of the alternatives

of wind, solar photovoltaic (both distributed and utility-scale), geothermal, and biomass is needed to complement rather than substitute for the Ridgecrest plant's contribution to meeting statewide RPS requirements.

Alternatives Table 1 lists the alternatives retained for analysis in this Staff Assessment/Draft Plan Amendment/Draft Environmental Impact Statement (SA/DPA/DEIS) and those eliminated, and summarizes the rationale for each conclusion.

Alternatives Table 1
Summary of Alternatives Retained and Eliminated

Alternative	Rationale for Retention or Elimination
Alternatives Retained for CEQA and NEPA analysis	
Northern Unit Alternative	Evaluated in the SA/DPA/DEIS because it would reduce impacts to desert washes, cultural resources, recreational uses, and biological resources and would avoid constructing a solar facility in Mohave Ground Squirrel Conservation Area (MGSCA).
Southern Unit Alternative	Evaluated in the SA/DPA/DEIS because it would reduce impacts to desert washes, cultural and biological resources.
Original Proposed Project	Evaluated in the SA/DPA/DEIS because it would reduce the amount of land developed in the MGSCA and would transmit the full 250 MW of power that Solar Millennium has requested.
No Project/No Action Alternative	Required under CEQA and NEPA. Note that additional NEPA No Action Alternatives are described below under Land Use Plan Amendment Alternatives.
Plan Alternatives Evaluated under NEPA	
Authorize RSPP project and approve California Desert Conservation Area (CDCA) Plan amendment	Action required under the CDCA Plan of 1980, as amended.
Authorize a reduced size project within the proposed project's boundaries through a CDCA Land Use Plan amendment (Northern Unit or Southern Unit Alternatives)	A smaller project reduces impacts; site location is an action for which an amendment to the CDCA Plan of 1980, as amended, is required.
Do not approve the right-of-way (ROW) grant and do not amend the CDCA Land Use Plan of 1980, as amended.	The first No Action Alternative: deny the ROW application and does not amend the CDCA Land Use Plan of 1980.
Do not approve the ROW grant and amend the CDCA Land Use Plan of 1980, as amended, to designate the area unsuitable for future solar development.	The second No Action Alternative: deny the ROW application and amend the CDCA Land Use Plan of 1980 to designate the site unsuitable for any future solar development.

Alternative	Rationale for Retention or Elimination
Do not approve the ROW grant and amend the CDCA Land Use Plan of 1980 to designate the area as suitable for future solar development.	The third No Action Alternative: deny the ROW application but amend the CDCA Land Use Plan of 1980 to designate the site as suitable for future solar development.
Alternatives Evaluated under CEQA	
Garlock Road Private Land Alternative	Would place project on disturbed land substantially reducing biological impacts of the RSPP
Solar Photovoltaic Technology – Utility Scale at Project Site	Would substantially reduce water use impacts and would reduce impacts to desert soil and biological habitat/species caused by site grading
Alternatives Eliminated from Detailed Analysis	
Alabama Hills Alternative	Would cause biological and cultural resource impacts and is located within the Alabama Hills National Recreational Area.
Boron Alternative	Proximity to Edwards Air Force Base could impact base operations. Feasibility is uncertain due to current operations on site and potential contamination from past operations.
South of California City Alternative	Would result in a much smaller project since less acreage available. Proximity to Edwards Air Force Base could impact base operations.
Ridgecrest Landfill	Would not allow optimum placement of arrays. Closer proximity to residents and to China Lake Naval Weapons Center could increase dust and glare impacts, respectively.
Stirling Dish Technology Alternative	Proprietary technology would preclude use by applicant. Would not substantially reduce impacts of the RSPP project
Solar Power Tower Technology Alternative	Tower height would increase visual impacts and could affect military operations.
Linear Fresnel Technology Alternative	Proprietary technology would preclude use by applicant. Would reduce area required but create greater visual impacts.
Distributed Solar Technology Alternative	While it will very likely be possible to achieve 250 MW of distributed solar energy over the coming years, the limited numbers of existing facilities make it difficult to conclude with confidence that this much distributed solar will be available within the timeframe required for the RSPP project. Barriers exist related to interconnection with the electric distribution grid. Also, solar PV is one of the components of the renewable energy mix required to meet the California Renewable Portfolio Standard requirements, and additional technologies like solar thermal generation, would also be required.
Wind Energy	While there are substantial wind resources in Kern County, environmental impacts could also be significant so wind would not reduce impacts in comparison to the RSPP Project. Also, wind is one of the components of the renewable energy mix required to meet the California Renewable Portfolio Standard requirements, so additional technologies like solar thermal generation, would also be required.

Alternative	Rationale for Retention or Elimination
Geothermal Energy	Despite the encouragement provided by Renewable Portfolio Standards and American Recovery and Reinvestment Act (ARRA) funding, few new geothermal projects have been proposed in the Indian Wells Valley and no geothermal projects are included on the Renewable Energy Action Team list of projects requesting ARRA funds. The existing Coso geothermal project will be at maximum output in the near future and new geothermal facilities in Inyo County are possible but not approved at this time. Therefore, the development of 250 MW of new geothermal generation capacity within the timeframe required for the RSPP project is considered speculative.
Biomass Energy	Most biomass facilities produce only small amounts of electricity (in the range of 3 to 10 MW) and so could not meet the project objectives related to the California Renewable Portfolio Standard. In addition, between 25 and 84 facilities would be needed to achieve 250 MW of generation, creating substantial adverse impacts.
Tidal Energy	Tidal fence technology is commercially available in Europe. However, it has not been demonstrated and proven at the scale that would be required to replace the proposed project, particularly with Pacific tides. Therefore, the development of 250 MW of tidal energy generation capacity within the timeframe required for the RSPP project is considered speculative.
Wave Energy	Unproven technology at the scale that would be required to replace the proposed project; it may also result in substantial adverse environmental impacts.
Natural Gas	Would not attain the objective of generating renewable power meeting California's renewable energy needs.
Coal	Would not attain the objective of generating renewable power meeting California's renewable energy needs and is not a feasible alternative in California.
Nuclear Energy	The permitting of new nuclear facilities in California is not currently allowable by law.
Conservation and Demand-side Management	Conservation and demand-management alone are not sufficient to address all of California's energy needs, and would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements.

B.2.2 INTRODUCTION

Solar Millennium, LLC, proposes to build the Ridgecrest Solar Power Project (RSPP) on land managed by the Bureau of Land Management (BLM), which is under the jurisdiction of the federal government. Since the BLM is a federal agency, the RSPP power plant is subject to review under the National Environmental Policy Act (NEPA) in addition to the California Environmental Quality Act (CEQA). The purpose of this

alternatives analysis is to comply with State and Federal environmental laws by providing an analysis of a reasonable range of feasible alternatives which could substantially reduce or avoid any potentially significant adverse impacts of the proposed project. This section summarizes the potentially significant adverse impacts of the proposed project and analyzes different technologies and alternative sites that may reduce or avoid some or all of those significant adverse impacts.

There are four alternatives to the proposed project/action. The four alternatives determined to be feasible by the BLM and the Energy Commission are: the Northern Unit Alternative, the Southern Unit Alternative, the Original Proposed Project Alternative, and the No Project/No Action Alternative. These alternatives are analyzed in further detail within each of the technical sections of this document, and these alternatives and the proposed action may be considered as the preferred alternative by both agencies.

This section analyzes two alternatives that are evaluated under CEQA only, and it discusses and analyzes all alternatives eliminated from consideration by both the Energy Commission and the BLM.

B.2.3 ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Solar Millennium, LLC proposes to build the RSPP facility on federal land within the jurisdiction of the BLM. Since the BLM is a federal agency and the California Energy Commission has State authority to license thermal power plants, the RSPP power plant is subject to review under both NEPA and CEQA.

California Environmental Quality Act Criteria

The *Guidelines for Implementation of the California Environmental Quality Act*, Title 14, California Code of Regulation, section 15126.6(a), provides direction by requiring an evaluation of the comparative merits of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project." In addition, the analysis must address the No Project Alternative (Cal. Code Regs., tit. 14, § 15126.6(e)).

The range of alternatives is governed by the "rule of reason" which requires consideration only of those alternatives necessary to permit informed decision making and public participation. CEQA states that an environmental document does not have to consider an alternative of which the effect cannot be reasonably ascertained and of which the implementation is remote and speculative (Cal. Code Regs., tit. 14, § 15125(d)(5)).

National Environmental Policy Act Criteria

NEPA requires that the decision-makers and the public be fully informed of the impacts associated with the proposed action. The intent is to make good decisions based on understanding environmental consequences, and to take actions to protect, restore, and enhance the environment.

Alternatives identified must be consistent with BLM's purpose and need for the action under consideration, which include consideration of the applicant's objectives (both are defined below). CEQ regulation at 40 CFR 1502.14(a) requires that an Environmental Impact Statement (EIS) rigorously explore and objectively evaluate all reasonable alternatives that are practical or feasible from the technical and economic standpoint and from using common sense, rather than simply desirable from the standpoint of the applicant. (CEQ Forty Questions, No. 1A)

Consideration of the No Action Alternative is mandated by NEPA. As with the CEQA No Project Alternative, this is the scenario that would exist if the proposed project were not constructed.

B.2.4 SCREENING METHODOLOGY

To prepare the alternatives analysis, the following methodology was used:

- Develop an understanding of the project, identify the basic objectives of the project, and describe its potentially significant adverse impacts.
- Identify and evaluate technology alternatives to the project such as increased energy efficiency (or demand-side management) and the use of alternative generation technologies (e.g., solar or other renewable or nonrenewable technologies).
- Identify and evaluate alternative locations for consideration by the Energy Commission.
- Evaluate potential alternatives to select those qualified for detailed evaluation.
- Evaluate the impacts of not constructing the project, known as the No Project alternative under CEQA and the No Action alternative under NEPA.

Based on this methodology, each potential alternative was evaluated according the following criteria for its ability to:

- Avoid or substantially lessen one or more of the potential significant adverse effects of the project as described above;
- Meet most or all of the project objectives;
- Be consistent with BLM's purpose and need.

B.2.4.1 APPLICANT'S PROJECT OBJECTIVES AND PURPOSE

Five primary objectives are set forth by Solar Millennium, LLC (SM 2009a):

- Develop a utility-scale solar energy project utilizing parabolic trough technology.
- Construct and operate an environmentally-friendly, economically-sound, and operationally-reliable solar power generation facility that would contribute over 500,000 megawatt hours (MWh) of clean, renewable solar energy per year to the State of California's renewable energy goals.
- Locate the project in an area with high solar insulation (i.e., high intensity solar energy).

- Interconnect directly to the California Independent System Operator (CAISO) grid through the Southern California Edison (SCE) electrical transmission system while minimizing additions to electrical infrastructure (e.g., avoiding lengthy new transmission lines).
- Commence construction in 2010 to qualify for the American Recovery and Reinvestment Act (ARRA) of 2009's Renewable Energy Grant Program.

Additionally, Solar Millennium, LLC states the purpose of the project as:

- Contribute to the achievement of the 20% Renewables Portfolio Standard (RPS) target set by California's governor and legislature.
- Support United States (U.S.) Secretary of the Interior Salazar's Order 3285 making the production, development and delivery of renewable energy top priorities for the U.S.
- Support Governor Schwarzenegger's Executive Order S-14-08 to streamline California's renewable energy project approval process and to increase the State's RPS to 33% renewable power by 2020.
- Sustain and stimulate the economy of Kern County in southern California by helping to ensure an adequate supply of renewable electrical energy, while creating additional construction and operations employment and increased expenditures in many local businesses.
- Generate electricity without significant emissions of greenhouse gases, thereby meeting the statewide reduction goals of Assembly Bill (AB) 32.

B.2.4.2 PROJECT OBJECTIVES OF THE ENERGY COMMISSION (CEQA)

After considering the objectives set out by the applicant, the Energy Commission has identified the following basic project objectives, which are used to evaluate the viability of alternatives in accordance with CEQA requirements:

- To construct and operate a 250 MW utility-scale solar facility in California capable of interconnecting directly to the California Independent System Operator (California ISO) Grid through the Southern California Edison (SCE) electrical transmission system;
- To locate the facility in areas of high solarity with ground slope of less than 5%;
- To contribute to the State of California's renewable energy goals, the National Energy Policy of 2001, and the Energy Policy Act of 2005 (Public Law 109-58, August 8, 2005) which encourage the development of renewable energy resources; and
- To commence construction in 2010 to qualify for the ARRA Renewable Energy Grant Program.
- To locate the facility at a site that would preserve the regions long term natural and cultural resources.

B.2.4.3 BLM PURPOSE AND NEED FOR PROPOSED PROJECT AND PLAN AMENDMENT

Bureau of Land Management

Solar Millennium, LLC has filed an application with BLM for a land use right-of-way (ROW) grant pursuant to the Federal Land Policy and Management Act (FLPMA, 43 USC 1761). Under FLPMA Title V Section 501 (a)(4) (Rights-of-Way), the United States Secretary of the Interior, as delegated to BLM, is authorized to grant ROW on lands under the jurisdiction of the BLM for the purpose of allowing systems for generation, transmission, and distribution of electric energy.

The BLM's purpose and need for the RSPP project is to respond to the Solar Millennium application under Title V of FLMPA for a ROW grant to construct, operate and decommission a solar thermal facility and associated infrastructure in compliance with FLPMA, BLM ROW regulations, and other applicable federal laws. The BLM will decide whether to approve, approve with modification, or deny issuance of a ROW grant to Solar Millennium for the proposed RSPP project. BLM's actions will also include concurrent consideration of amending the California Desert Conservation Area (CDCA) Plan of 1980. The decision the BLM will make is whether or not to grant a ROW and, if so, under what terms and conditions, and whether or not to amend the land use plan.

Solar power facilities are an allowable use of the proposed project area within the CDCA Plan. Chapter 3, “Energy Production and Utility Corridors Element” of the CDCA Plan requires that newly proposed sites associated with power generation or transmission not already identified in the Plan will be considered through the plan amendment process. The proposed RSPP is not currently identified in the proposed power facility and transmission line element within the Plan. As such, a plan amendment is required in order to determine that the site is suitable for solar development.

Federal orders and laws require government agencies to evaluate energy generation projects and facilitate the development of renewable energy sources. The Energy Policy Act of 2005 (EPAct) requires the United States Department of the Interior (DOI), BLM’s parent agency, to approve at least 10,000 MW of renewable energy on public lands by 2015. Executive Order 13212, dated May 18, 2001, mandates that agencies expedite their “review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections” in the “production and transmission of energy in a safe and environmentally sound manner.”

Secretarial Order 3283, *Enhancing Renewable Energy Development on the Public Lands*, requires the BLM to ensure that processing and permitting of renewable energy projects complies with the requirements of the National Environmental Policy Act, Endangered Species Act, National Historic Preservation Act, and all other laws and regulations; improve efficiencies in the processing of renewable energy applications and consistent application of renewable energy policies; and develop Best Management Practices for renewable energy projects on public lands to ensure the most environmentally responsible development of renewable energy.

Secretarial Order 3285, *Renewable Energy Development by the Department of the Interior* requires the BLM to encourage the development of environmentally responsible renewable energy generation. Both of these Secretarial Orders will be considered in responding to the in responding to the Solar Millennium application for the proposed RSPP project.

Department of Energy

Solar Millennium, LLC has also applied to the United States Department of Energy (DOE) for a loan guarantee pursuant to Title XVII of the EPAct. Title XVII of EPAct authorizes the United States Secretary of Energy to make loan guarantees for a variety of types of projects, including those that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The purpose and need for action by DOE is to comply with their mandate under EPAct by selecting eligible projects that meet the goals of the Act.

B.2.4.4 SUMMARY DESCRIPTION OF THE PROPOSED PROJECT AND PROJECT IMPACTS

Section B.1 of the Staff Assessment/Draft Plan Amendment/Draft Environmental Impact Statement (SA/DPA/DEIS) provides a detailed description of the proposed project, and a summary is presented here as context for the alternatives analysis. The proposed RSPP project is a nominal 250 MW solar plant located on approximately 2,002 acres within a ROW application of approximately 3,995 acres. The project is divided into two sites, Solar Field #1 and Solar Field #2.

- Solar Field #1 (North) would be located north of Brown Road on approximately 1,118 acres and create 146 MW of solar energy. Solar Field #1 would be the location of the maintenance building, parking area, bioremediation area, power block area and operational power facilities, transmission line, potable and treated water tanks; and auxiliary equipment (i.e., water treatment system and the main office area). These facilities would support both solar fields.
- Solar Field #2 (South) would be located south of Brown Road on approximately 809 acres and create 104 MW of solar energy. The area south of Brown Road would be the location of the switchyard and transmission line interconnection. Solar Field #2 would require the existing 115 and 230kV SCE-owned transmission lines to be re-routed around the project footprint.
- This alternative would amend the CDCA Plan to find the site suitable for solar energy development.

Based on the analysis presented in the technical sections of this SA/DPA/DEIS, the following impacts have been identified as issues of greatest concern for the proposed RSPP project:

- **Biological Resources**: The RSPP site is located on undisturbed high quality desert tortoise (*Gopherus agassizii*) and Mohave ground squirrel (*Spermophilus*

mohavensis) habitat; in addition, the site supports a diversity of mammals, birds, and reptiles, including additional special-status wildlife species. Grading on the site would result in the destruction of unique habitat that supports an unusually high concentration of desert tortoise in a region with generally low desert tortoise concentration. Direct impacts to other special-status animal species and possibly special-status plant species may also occur. Mohave ground squirrel population connectivity would also be at risk as the project would contribute to isolation of Mohave ground squirrel populations north and south of the project. The large population of desert tortoises would require translocation which is generally accompanied by high mortality rates. Solar Field#2 would eliminate land within the MGSCA. Because effective, feasible mitigation measures could not be identified by staff, impacts to desert tortoise and Mohave ground squirrel are considered to be unavoidable.

- **Cultural Resources**: Due to the relatively undisturbed nature of the area, the frequency of identified cultural resources on or adjacent to the proposed project site, and the historic tribal use of the area, the RSPP project would create impacts to numerous cultural resources. The installation of solar trough arrays and associated facilities over the 2,002-acre project site would affect 17 treated-as-eligible to the National and California Registers of Historic Places archaeological sites and numerous isolated artifacts including 4 historic resources and 13 prehistoric cultural resources. Since the nature of parabolic trough technology does not allow for reduced ground disturbance or flexibility of the location of the solar loops, the construction of the project would lead to the whole and partial destruction of these resources and an unknown number of possible buried cultural resources. Construction of the project would impair tribal use of historic lands. The El Paso Mountain sacred lands are listed in Native American Heritage Commission's database of sacred lands. The project would also encroach on the national register listed Last Chance Canyon Archaeological District.
- **Water Resources:** The project proposes using high quality groundwater from the Indian Wells Valley Water District wells located within the Indian Wells Valley Groundwater Basin for site construction and plant operations. Water use by the project may exacerbate the continuing overdraft in the basin. The RSPP project would impact the El Paso wash by a proposed culvert installation at Brown Road, a HTF pipe bridge and the proposed 230 kV transmission line that would cross over the wash, in addition to nine drainage channel tie-ins constructed to convey storm water off the site to its natural flow toward El Paso wash. The southern field would intercept an ephemeral wash; the project proposes to re-route this wash. These proposed changes to the El Paso wash and ephemeral washes have the potential to disrupt the hydrological and biological functions and processes of the washes.
- **Visual Resources**: The RSPP project would introduce an industrial character to an area that is currently free from such. Although Hwy 395 is not a designated Scenic Highway and the Indian Wells Valley does not have similar scenic designation, the RSPP project would substantially degrade the existing visual character and quality of the site and its surroundings, which is considered to have moderate-to-high visual sensitivity and viewing characteristics. Because effective, feasible mitigation measures for a project of this scale could not be identified by staff, these impacts are considered to be unavoidable.

- **Traffic and Transportation**: The proposed intersection at Brown Road and Highway 395 has a collision rate 2.8 times higher than statewide average. Construction traffic using this access point would pose a potential risk. CalTrans is currently evaluating future improvements to Highway 395 which may or may not be consistent with the proposed use of the site. A new access point north of the current access may be necessary.
- **Land Use**: The RSPP project footprint would encompass approximately 2,000 acres of public land and could eliminate other BLM authorized land uses, including off-highway vehicle (OHV) activity, and use of the land for camping, hiking and astrological viewing.

The alternatives analysis focuses on the consideration of these impacts, along with other environmental and engineering impacts, and the extent to which they could be reduced or eliminated by alternatives to the proposed project.

B.2.5 SUMMARY OF SCOPING AND SCREENING RESULTS FOR ALTERNATIVES

The public scoping comment period allowed the public and regulatory agencies an opportunity to comment on the scope of the SA/DPA/DEIS, comment on the alternatives considered, and identify issues that should be addressed in the SA/DPA/DEIS. The discussion below presents the key issues identified from the written and oral comments received during the scoping process on the RSPP project. The specific issues raised during the public scoping process are:

- Consider a reduced project size;
- Consider reconfiguration alternatives to minimize impacts to wildlife movement and sensitive biological resources and washes;
- Consider sites outside the Mohave Ground Squirrel Conservation Area and prime desert tortoise habitat;
- Consider conjunctive use of disturbed land in combination with adjacent lower value federal land;
- Consider sites not under BLM jurisdiction such as fallowed alfalfa fields north of the City of Ridgecrest, in the Fremont Valley and California City and agricultural land near Garlock;
- Consider property surrounding the Ridgecrest Landfill;
- Consider alternative technologies that use less water;
- Consider distributed generation.

Scoping comments are also listed Executive Summary of this SA/DPA/DEIS and in the BLM's Final Scoping Report.

B.2.6 ALTERNATIVES EVALUATED UNDER NEPA AND CEQA

Section B.2.1 describes the requirements for evaluation of alternatives under NEPA and CEQA. This section describes the four alternatives to the proposed project that are retained for analysis: the Northern Unit Alternative, the Southern Unit Alternative, the Original Proposed Project Alternative, and the No Project/No Action Alternative. The proposed project and the retained alternatives are evaluated under both NEPA and CEQA in Sections C and D (Environmental and Engineering Analysis). Conclusions regarding the NEPA and CEQA alternatives are presented in the Section C and D evaluations, and are summarized for major issue areas in Section B.2.4, above.

B.2.6.1 NORTHERN UNIT ALTERNATIVE

The Northern Unit Alternative would essentially be Solar Field#1 (north of Brown Road) of the proposed project. The boundaries of this alternative are shown in **Alternatives Figure 1** (all figures are presented at the end of this section). The Northern Unit Alternative would consist of 167 solar collector array loops with a net generating capacity of approximately 146 MW occupying approximately 1,135 acres of land. This alternative would retain 58% of the proposed solar array loops and would affect 58% of the land of the proposed 250 MW project.

Similar to the proposed project, the Northern Unit Alternative would transmit power to the grid through the planned Southern California Edison (SCE) 230-kV substation to be located near the proposed project site. The power block covering approximately 18 acres, would remain north of Brown Road, as proposed by the project and would include all operational power facilities, structures, transmission lines and related electrical system; potable and treated water tanks; and auxiliary equipment (i.e., water treatment system, diesel-powered emergency generator, and firewater system).

The proposed 3,900 foot transmission line alignment would connect to the proposed switchyard (3.2 acres) adjacent to the existing SCE 230-kV transmission line, west of the proposed project. In addition, the site would require access roads, a parking lot, bio-remediation unit and main office building (3 acres) all of which are proposed north of Brown Road within the proposed project footprint. The proposed 16.3 acre water line would remain at the location as proposed by the project. The Northern Unit Alternative would not require the relocation of the two existing SCE transmission lines.

The Northern Unit Alternative is evaluated in this SA/DPA/DEIS because it would lessen some of the impacts of the project. Additionally, the Northern Unit Alternative would allow the applicant to contribute clean, renewable energy to help meet the State's energy goals, while reducing impacts to the desert environment. A limited acreage alternative was suggested in scoping comments.

Under the Northern Unit Alternative, the Energy Commission and BLM would approve only the 146 MW facility and not the 250 MW project that is proposed.

This alternative would amend the CDCA Plan to find the site suitable for solar energy development.

B.2.6.2 SOUTHERN UNIT ALTERNATIVE

The Southern Unit Alternative would essentially be Solar Field#2 (south of Brown Road) of the proposed project. The boundaries of this alternative are shown in **Alternatives Figure 2**. The Southern Unit Alternative would consist of 119 solar array loops with a net generating capacity of approximately 104 MW occupying approximately 908 acres of land. This alternative would retain 42% of the proposed solar array loops and would affect 42% of the land of the proposed 250 MW project.

Similar to the proposed project, the Southern Unit Alternative would transmit power to the grid through the planned SCE 230-kV substation to be located near the proposed project site. The power block, spanning approximately 18 acres, would remain north of Brown Road, as proposed by the project and would include all operational power facilities, structures, transmission lines and related electrical system; potable and treated water tanks; and auxiliary equipment (i.e., water treatment system, diesel-powered emergency generator, and firewater system).

The proposed 3,900-foot transmission line alignment would connect to the proposed switchyard (3.2 acres) adjacent to the existing SCE 230-kV transmission line, west of the proposed project. In addition, the site would require access roads, a parking lot, bio-remediation unit and main office building (3 acres) all of which are proposed north of Brown Road. The proposed 16.3 acre water line would remain at the location as proposed by the project. Similar to the proposed project, the Southern Unit Alternative would require the relocation of the two existing SCE transmission lines; this realignment would require approximately 58.2 acres.

The Southern Unit Alternative is evaluated in this SA/DPA/DEIS because it would reduce some impacts of the project. Additionally, the Southern Unit Alternative would allow the applicant to contribute clean, renewable energy to help meet the State's energy goals, while minimizing impacts to the desert environment. A limited acreage alternative was suggested in scoping comments.

Under the Southern Unit Alternative, the Energy Commission and BLM would approve only the 104 MW facility and not the 250 MW project that is proposed.

This alternative would amend the CDCA Plan to find the site suitable for solar energy development.

B.2.6.3 ORIGINAL PROPOSED PROJECT

The Original Proposed Project Alternative would be a 250 MW solar facility as originally proposed by Solar Millennium. This alternative is analyzed because it would reduce the amount of land developed within the Mojave Ground Squirrel Conservation Area and it could transmit the full 250 MW of power that Solar Millennium has requested.

The Original Proposed Project Alternative would consist of 278 solar array loops with a net generating capacity of approximately 250 MW occupying approximately 1,760 acres of land. This alternative would occupy approximately 755 acres north of Brown Road and approximately 685 acres south of Brown Road. A shorter transmission interconnection – 1,250 feet as compared to the proposed project interconnection of 3,900 feet – would be needed.

The boundaries of Original Proposed Alternative are shown in **Alternatives Figure 3**. This project footprint contains two desert ephemeral washes that would require redirection and smaller dry desert washes also traverse the site. In addition this site is the location of prime desert tortoise and Mojave ground squirrel habitat.

Similar to the proposed project, the Original Proposed Project Alternative would transmit power to the grid through the planned SCE 230-kV substation located near the proposed project site and would require infrastructure including main office building (3 acres), power block, water line, transmission line, switch yard, access roads, parking area, bio-remediation unit and maintenance building. The off-site water line covers approximately 18 acres and would be in the same location as the proposed project. The bioremediation unit would be located north of Brown Road, and the power block and ancillary facilities would be located south of Brown Road on approximately 18 acres in addition to the transmission line and switch-yard (5.5 acres). The Original Proposed Project Alternative would require the relocation of the two existing SCE transmission lines. However, the proposed realignment would be reduced in length by 550 feet as compared to the proposed project.

The Original Proposed Alternative is evaluated in this SA/DPA/DEIS because it reduces land developed with the MGSCA. Additionally, the Original Proposed Alternative would allow the applicant to contribute clean, renewable energy to help meet the State's energy goals.

This alternative would amend the CDCA Plan to find the site suitable for solar energy development.

B.2.6.4 NO PROJECT/NO ACTION ALTERNATIVE

CEQA No Project Alternative

The No Project Alternative under CEQA defines the scenario that would exist if the proposed RSPP project were not constructed. The CEQA Guidelines state that "the purpose of describing and analyzing a 'no project' alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project" (Cal. Code Regs., tit. 14 § 15126.6(i)). The No Project analysis in this SA/DPA/DEIS considers existing conditions and "what would be reasonably expected to occur in the foreseeable future if the project were not approved…" (Cal. Code Regs, tit. 14 § 15126.6(e)(2)).

If the No Project Alternative were selected, the construction and operational impacts of the RSPP project would not occur. There would be no grading of the site, no loss of resources or disturbance of approximately 2,002 acres of desert habitat, and no installation of power generation and transmission equipment. The No Project Alternative would also eliminate contributions to cumulative impacts on a number of resources and environmental parameters in Kern County and in the Mojave Desert as a whole.

In the absence of the RSPP project, other power plants, both renewable and non-renewable, may be constructed to serve the demand for electricity and to meet RPS requirements. The impacts of other utility-scale solar projects are expected to be less

than those of the proposed project because of the very large population of desert tortoises at the RSPP site and the location of MGSCA land within the RSPP site.

If the proposed project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide, and SCE would not receive the 250 MW contribution to its renewable state-mandated energy portfolio.

NEPA No Action Alternatives

Under NEPA, the No Action Alternative is used as a benchmark of existing conditions by which the public and decision makers can compare the environmental effects of the proposed action and the alternatives. Like the No Project Alternative described above, under the No Action Alternative, the impacts of the RSPP project would not occur.

BLM's alternatives related to the No Action Alternative and the Plan amendment are the following:

- **No Action on project but amend the CDCA plan to classify the area as suitable for future solar development.** The RSPP project is not approved (project denied), and no ROW grant is issued to Solar Millennium, but the CDCA plan is amended to classify the project area as suitable for large scale solar energy development under a future project .
- **No Action on project and amend the CDCA plan to classify the area as unsuitable for future solar development.** The RSPP project is not approved (project denied) and no ROW grant is issued to Solar Millennium, and the CDCA plan is amended to classify the project area as unsuitable for large scale renewable energy development.
- **No Action on project application and on land use plan amendment**. The RSPP project is not approved (denied), no ROW grant is issued, and no CDCA Plan amendment is approved.

Each of these No Action Alternatives is addressed under each resource element of Sections C and D.

B.2.7 CEQA ONLY ALTERNATIVES RETAINED

Two alternatives are evaluated by the Energy Commission under CEQA only. The alternative site evaluated in this section, the Garlock Road Alternative, is located on private lands. The second alternative is a solar photovoltaic facility located at the proposed project site.

The Energy Commission does not have the authority to approve an alternative or require Solar Millennium, LLC to move the proposed project to another location, even if it identifies an alternative site that meets the project objectives and avoids or substantially lessens one or more of the significant adverse effects of the project. Implementation of an alternative site would require the applicant to submit a new Application for Certification (AFC), including revised engineering and environmental analyses. This more rigorous AFC-level analysis of any of the alternative sites could reveal environmental impacts; nonconformity with laws, ordinances, regulations, and

standards; or potential mitigation requirements that were not identified during the more general alternatives analysis presented herein. Preparation and review of a new AFC for the RSPP on an alternative site would require substantial additional time.

Alternatives sites for the RSPP were suggested in scoping comments as means to reduce the project impacts to biological and cultural resources. The Garlock Road Alternative and photovoltaic technology were suggested by scoping comments, and numerous scoping comments suggested consideration of a private/disturbed land alternative.

Of the two alternatives considered for the analysis in this SA/DPA/DEIS, Garlock Road Alternative and Photovoltaic Technology Alternative at the Proposed Site, the Garlock Road Alternative is illustrated on **Alternatives Figure 4** at the end of this section. Images that show potential photovoltaic technologies are illustrated at the end of this section in **Alternatives Figure 5**.

B.2.7.1 SITE SELECTION CRITERIA

The following site selection criteria identified in the RSPP AFC were used to choose the proposed site (SM 2009a):

- The facility should be located in an area of long hours of sunlight (low cloudiness) and insolation should be at a level of 7 kilowatt-hours per square meter per day;
- The site should be relatively flat with a grade of no more than 2%;
- The site should be large enough to include a 250 MW solar power plant, and large enough to site outside of desert washes, to the greatest extent possible;
- The site should not be highly pristine or biologically sensitive (e.g., not a wilderness area, Area of Critical Environmental Concern [ACEC] or a Desert Wildlife Management Area [DWMA]). The site should not be located in a military base or park;
- Land must be available for sale or lease/ROW and landowner must be willing to negotiate a long-term option agreement so that site control does not require a large capital investment until license is obtained;
- The project must be located within 10 miles of a California ISO - interconnected transmission line with capacity rating of 230kV or higher.
- The site should have ease of access and close proximity to access roads;
- The site should be close enough to areas with large construction labor pools within daily commuting range;
- The site should be located on property currently available at a reasonable cost.

The site criteria do not state a minimum acreage required for a 250 MW parabolic trough system facility. Within the 3,995 acres for which RSPP has requested a ROW grant from BLM, approximately 1,944 acres would be graded for the project, including access roads and infrastructure (SM 2010a). Similar acreage would be required for a 250 MW facility at the Garlock site. More acreage would be required for a 250 MW PV facility at the RSPP site.

Other Sites on BLM Land

The BLM has received a large number of utility-scale solar energy project proposals for BLM-administered lands throughout California. The BLM processes solar energy ROW grant applications under its Solar Energy Development Policy (Instructional Memorandum No. 2007-097) and addresses environmental concerns for the utility-scale energy projects on a case-by-case basis. An alternative site on BLM land where there is a pending application for another renewable project is not considered as a viable alternative.

The BLM and DOE are preparing a Programmatic Environmental Impact Statement (PEIS) on solar energy development in six states in the western U.S. (Arizona, California, Colorado, New Mexico, Nevada, and Utah) (USDOE 2008). As part of that PEIS, the BLM and DOE identified 24 tracts of BLM-administered land for in-depth study for solar development, some or all of which may be found appropriate for designation as solar energy zones in the future. The public scoping period on the solar energy zone maps ended in September 2009. The Draft PEIS is anticipated to be published in 2010.

B.2.7.2 GARLOCK ROAD ALTERNATIVE

Multiple scoping comments requested that an alternative site be considered on disturbed land, thereby lessening the potential project impacts to the desert environment. In order to avoid impacting active agricultural land, no longer productive land or land that would not be economically viable for agriculture was considered. This land must also achieve most of the site selection criteria defined by RSPP and provided earlier in this section.

Alternatives Figure 4 shows the Garlock Road Alternative site. The site is located south of the intersection of Garlock Road and Redrock-Randsburg Road, Kern County; both are two-lane paved roads, connecting Highway 395 near Johannesburg to Highway 14 south of Red Rock Canyon State Park. The site lies in Fremont Valley boarded by the El Paso Mountains on the north and Rand Mountains on the southeast, and drains to Koehn Dry Lake to the southwest. Railroad tracks run by the north of the site along the south side of Redrock-Randsburg Road; it is unclear whether the tracks are operable.

This alternative is comprised of 11 separate parcels totaling approximately 2,146 acres. The parcels range in size from 80 to 480 acres. Six parcels encompassing 1,523 acres are owned by one land owner who has indicated that this land may be available for sale. As stated above, approximately 1,944 acres of the proposed site location would be graded for the RSPP project, including access roads, and infrastructure.

An approximately 8-mile transmission interconnection would be required to connect the site to SCE's Kramer-Inyoken 230-kV transmission line, which runs near Highway 395. The transmission interconnection route would follow Garlock Road to the east on the south side of the road and interconnect to the existing line at the transmission line's point of crossing with Garlock Road; additional private party and BLM parcel crossings would be required. A CDCA Plan amendment from BLM and easement acquisition from private land owners would be required. Alternatively, the Garlock Road Alternative could

interconnect with a Los Angeles Department of Water & Power (LADWP) 230-kV line along the east side of Highway 14; this route would be approximately 25 miles.

Due to the remote location, interconnection to a natural gas pipeline could be lengthy. Trucking and storing propane onsite has been proposed for other projects in the vicinity (i.e. Beacon Solar Energy Project and the RSPP project) and would likely be used for a project at the Garlock Road site.

Environmental Assessment of the Garlock Road Alternative

Air Quality

Environmental Setting

Each local air quality district in California establishes its own significance criteria for environmental review of projects based on the specific conditions within each air basin. Like the proposed RSPP project, the Garlock Road Alternative site is in the Mojave Desert Air Basin, regulated by the Kern County Air Pollution Control District (KCAPCD). The pollutants of concern for Kern County are particulate matter that is 10 microns or less in diameter (PM10) and ozone (O3) (Kern County 2007). More specific information regarding the Mojave Desert Air Basin and KCAPCD can be found in the **AIR QUALITY** section of this SA/DPA/DEIS.

Environmental Impacts

Air quality impacts would principally consist of: exhaust emissions (*e.g.,* ozone precursors, NOx and VOC) from on-site, off-road and gasoline-powered construction equipment; other criteria pollutants, such as CO and PM10; and toxic diesel particulate matter emissions) and fugitive particulate matter (dust) from travel on unpaved surfaces. These emissions are described in the **AIR QUALITY** section of the SA/DPA/DEIS for the proposed project and would be essentially the same at any site.

Exhaust emissions would also be caused by workers commuting to and from the work sites, from trucks hauling equipment and supplies to the sites, and crew trucks (e.g., derrick trucks, bucket trucks, pickups). Exhaust emissions from heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) would be essentially the same at any site. If workers were still to come from the Ridgecrest area, they would have to travel over 20 miles on mostly two-lane highway to reach the Garlock Road site. The site is over 25 miles from both California City and Mojave, and 60 miles from Lancaster.

Emissions from the Garlock Road Alternative would need to be controlled to satisfy the air permitting requirements of the KCAPCD. As such, construction and operation of a 250 MW project at Garlock Road Alternative site would be subject to permit requirements, and would require mitigation, similar to that of the proposed RSPP project, to avoid significant air quality impacts. Appropriate mitigation at the Garlock Road Alternative site would likely involve similar, locally-oriented recommendations such as the conditions of certification presented in the **AIR QUALITY** section of this SA/DPA/DEIS to reduce ozone and PM10 impacts.

Comparison to Proposed Project

The construction and operation emissions resulting from building a 250 MW solar power plant at Garlock Road Alternative site would be similar to those of the RSPP project at the Ridgecrest City region. Like the proposed project, the Garlock Road Alternative is non-attainment for PM10 and O3. It is likely that construction and operation NOx, VOC and PM emissions and fugitive dust would require mitigation. Assuming implementation of similar conditions of certification, operational emissions from the Garlock Road Alternative site would be similar to those of the proposed RSPP project site.

Biological Resources

The Garlock Road Alternative site is located in an open space area of Kern County. The primary land cover at the site is disturbed habitat, characterized by inactive agriculture land. Two washes are located onsite; one borders the northern edge of the site and the other skirts the northwestern most corner of the site. The Garlock Road Alternative site is surrounded to the north, east and south by the Rand Mountains Management Area (RMMA).

The site is surrounded largely by undisturbed, native vegetation communities. The Desert Tortoise Research Natural Area (DTNA) is located south and east of Koehn Lake, approximately three miles southwest of the Garlock Road Alternative site. Both the RMMA and the DTNA are critical habitat locations for the desert tortoise. In addition, a portion of the RMMA is designated as an ACEC (BLM 1980) and surrounds the site to the east, north and south. Most of the RMMA occurs within the Fremont-Kramer Desert Wildlife Management Area (DWMA). Although disturbed private land, some maps appear to show the site within the boundaries of the Mohave Ground Squirrel Conservation Area and the Fremont-Kramer DWMA; it is suspected that this is due to the scale of the maps, and it is only the surrounding BLM land that is included.

A reconnaissance survey of the alternative site was conducted in December, 2009. Since the Garlock Alternative site is exclusively private land, access was restricted to the entire site. The site was viewed by staff with binoculars from vantage points at surrounding locations where legal access could be made. In addition, staff conducted aerial photograph interpretation of locations that could not be visually observed from a distance. Reconnaissance surveys included comparing and photographing representative samples of vegetation communities throughout the RSPP site and the Garlock Road Alternative site. Vegetation community types and plant and animal species (or sign) observed were noted, as well as potentially jurisdictional features. Sensitive species with potential to occur on each alternative were determined by a habitat-based analysis and by consulting the California Natural Diversity Database (CNDDB).

The majority of the Garlock Road Alternative site is inactive agriculture comprised of fallow fields. The field reconnaissance surveys identified five vegetation communities on the Garlock Road Alternative site: disturbed habitat, disturbed desert saltbush scrub, disturbed stabilized desert dunes, desert saltbush scrub, and developed. Each vegetation community and associated acreages are described below.

Disturbed habitat accounts for 1,317 acres of the Garlock Alternative site. Disturbed habitat occurs in the central and westerns portions of the site, these areas have been subjected to the most intensive agricultural practices on the site. This cover type is dominated by species such as mustard (*Sisymbrium* sp), thistle (*Salsola* sp.), Mediterranean grass (*Schismus* sp.), and filaree (*Erodium* sp.).

Disturbed stabilized desert dunes occur in the eastern portion of the Garlock Road Alternative site and covers 572 acres of the proposed project site. Old farming equipment was observed at this location. The primary vegetation cover is dominated by annual, herbaceous plant species such as Mediterranean grass and filaree with a few scattered thistle and desert saltbush (*Atripklex polycarpa*).

Disturbed desert saltbush scrub and **desert saltbush scrub** covers 355 acres at the Garlock Road Alternative site. Disturbed desert saltbush scrub is dominated by desert saltbush in addition; substantial plant cover occurs in this vegetation community and is composed of species such as filaree, Mediterranean grass, mustard, thistle and scalebroom (*Lepidospartum squamatum*). Desert saltbush scrub occurs in the northeastern portion of the site. This vegetation community is dominated by desert saltbush and also supports some thistle, Mediterranean grass, and filaree.

Developed areas account for 3.8 acres within the Garlock Road Alternative site. This cover type occurs near the central portion of the site and consists of abandon buildings.

Alternatives Table 2 lists the sensitive species found in CNDDB records within five miles of the Garlock Road Alternative site. No critical habitat occurs on the site.

Alternatives Table 2
California Natural Diversity Database Records for Special Status Species Within 5 Miles of the Garlock Road Alternative

Common Name / *Scientific Name*	Status State/Fed/CNPS/BLM	Occurrence Within 5 Miles of Garlock Road Alternative Site
Red Rock poppy *Eschscholzia minutiflora* ssp. *twisselmannii*	--/--/List 1B.2/S	Reported in seven locations 0.8 mile to 4.8 miles from the site.
Charlotte's phacelia *Phacelia nashiana*	--/--/List 1B.2/S, WEMO	Reported in seven locations 1.4 miles to 4.1 miles from the site.
Desert tortoise *Gopherus agassizii*	ST/FT/--/WEMO	Large polygon (1,700 square mile area) includes the site.
Burrowing owl *Athene cunicularia*	SSC/--/--/S	Reported in one location four miles south of site.
Western snowy plover *Charadrius alexandrinus nivosus*	SSC/FT/--/--	Reported around Koehn Lake approximately 1.4 miles southeast of the site.
Prairie falcon *Falco mexicanus*	Formerly SSC but no longer is of special status.	Reported in six locations north and west of the site, including in the northern portion of the site.
Loggerhead shrike *Lanius ludovicianus*	SSC/--/--/WEMO	Reported in one location 1.5 miles west of the site.
Le Conte's thrasher *Toxostoma lecontei*	SSC/--/--/S, WEMO	Reported in two locations 0.5 mile north of the site and one mile west of the site.
Mohave ground squirrel *Spermophilus mohavensis*	ST/--/--/WEMO	Reported in three locations 1.2 miles, 3.4 miles, and 3.75 miles east of the site.
San Joaquin kit fox *Vulpes macrotis mutica*	ST/FE/--/--	Reported approximately three miles east of the site.

Source: CDFG 2009.

Status Codes:

Federal FE = Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT = Federally listed, threatened: species likely to become endangered within the foreseeable future

State SE = State listed, endangered
ST = State listed as threatened
SSC = Species of Special Concern

California Native Plant Society
List 1B - Rare, threatened, or endangered in California and elsewhere
List 2 - Rare, threatened, or endangered in California but more common elsewhere
List 3 - Plants which need more information
List 4 - Limited distribution – a watch list
0.1 - Seriously threatened in California (high degree/immediacy of threat)
0.2 - Fairly threatened in California (moderate degree/immediacy of threat)
0.3 - Not very threatened in California (low degree/immediacy of threats or no current threats known)

BLM -Bureau of Land Management
S = Sensitive

BLM Manual § 6840 defines sensitive species as "…those species that are (1) under status review by the FWS/NMFS; or (2) whose numbers are declining so rapidly that federal listing may become necessary, or (3) with typically small and widely dispersed populations; or (4) those inhabiting ecological refugia or other specialized or unique habitats." <www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitiveAnimals.pdf>

WEMO = Special-status species considered in analysis of the West Mojave Plan (BLM 20005)

Following are descriptions of the sensitive species in the vicinity of this alternative site (SM, 2009a, CDFG 2010).

- **Red Rock poppy** is an annual herb that occurs in desert washes, flats and slopes predominantly in an area known as the Summit Range (Rand Mountain range) and the El Paso Mountains (Clark and Faull 1991). All known occurrences of the Red Rock poppy occur within the West Mojave Planning Area.
- **Charlotte's phacelia** is an annual herb that occurs on sandy to rocky granite slopes within Joshua tree woodland, Mojave desert scrub habitat and pinyon and juniper woodland. .
- **Desert tortoise** is most often found in association with creosote bush, Joshua tree woodland, and saltbush scrub with adequate annual forbs for foraging.
- **Burrowing owl** is a year-long resident of open, dry grassland and desert habitats. It is also found as a resident in grass, forb, and open shrub stages of pinyon-juniper and ponderosa pine habitats as well as agricultural lands. .
- **Western snowy plover** occurs at inland shores of salt ponds and alkali or brackish inland lakes.
- **Prairie falcon** nests in cliffs and escarpments; forages in adjacent dry, open terrain or uplands and marshes.
- **Loggerhead shrike** prefers open habitats with scattered shrubs, trees, posts, fences, utility lines or other perches.
- **Le Conte's thrasher** is a yearlong resident of desert flats, washes and alluvial fans with sandy and/or alkaline soil and scattered shrubs.
- **Mohave ground squirrel** is endemic to the west Mojave desert and occurs in a variety of habitats including saltbush, alkali desert, and creosote bush scrub at elevations from 1,800 to 5,000 feet.
- **San Joaquin kit fox** occurs in open desert, areas of desert scrub, grasslands, and sandy dunes and in areas with sandy and loamy soil.

No special status plant or animal species were reported on the Garlock Road Alternative site. During the reconnaissance survey, access to this site was restricted to public roads, making it difficult to look for animal sign.

The Garlock Road Alternative site would be located largely on disturbed land and the overall potential for special status plant species to occur is low. In addition, desert tortoise is expected to be low because in some areas the substrate may be too sandy to support burrowing (e.g., disturbed stabilized dunes) and/or the vegetation has been too altered to provide necessary forage and shelter (e.g., disturbed habitat). Tortoise could occur immediately offsite in surrounding Mojave creosote bush scrub habitat that surrounds the eastern, southern and northern portions of the site. Mojave creosote bush scrub habitat is appropriate habitat for the desert tortoise, in addition to desert saltbush scrub and disturbed desert saltbush scrub which lies adjacent to the Garlock Road Alternative site.

The largely disturbed nature of the Garlock Road Alternative site would limit wildlife use of the site for foraging, sheltering, breeding, or dispersal. However, since the site occurs in the center of Fremont Valley, wildlife may cross the site to travel between the mountains to the north and south or between the upper elevations in the valley to the east and to Koehn Lake to the west. Thus this site could potentially serve as a connector to areas of high quality habitat. Desert tortoise critical habitat is to the north, east and south of the Garlock Road Alternative site.

Environmental Impacts - Construction

Approximately 2,146 acres of fallow agricultural land would be permanently lost as a result of vegetation clearing, grading, and construction of the solar facilities, potentially affecting special status animal species. Few, if any, impacts to listed or sensitive plant species would be expected because the site has been previously impacted by agriculture operations and is mostly disturbed. The only special status species with moderate potential to occur on the Garlock Road Alternative site are not listed species.

Additional impacts would occur due to the construction of linear facilities associated with the project facilities at the Garlock Road Alternative site, including access roads and a transmission line of approximately eight miles.

Impacts/Mitigation to Wildlife

Building a solar facility at the Garlock Road Alternative site would primarily impact fallow agricultural lands. Impacting agricultural lands would potentially have an adverse effect on listed and sensitive wildlife species and their habitats either directly or through habitat modifications. Some special status wildlife species have moderate potential to occur on the site including western burrowing owl, northern harrier, loggerhead shrike, desert kit fox, and pallid bat. The Garlock Road Alternative site could provide foraging habitat for all of these species and breeding habitat for the western burrowing owl and desert kit fox. All of this habitat would be directly and permanently impacted during construction.

The desert tortoise has been reported within a 1,700 square mile area that includes the Garlock Road Alternative site. However, the potential for the tortoise to occur onsite is low, given the lack of suitable habitat onsite. The tortoise could occur immediately offsite in surrounding Mojave creosote bush scrub habitat and desert tortoise critical habitat. Increased construction truck traffic along both Garlock Road and Redrock-Randsburg Road could increase vehicle-related tortoise mortality. Construction of the proposed project at the Garlock Road Alternative site could result in the spread of invasive plant species to adjacent tortoise habitat, thereby degrading its quality. Additional impacts to vegetation communities, and possibly special status species could occur due to the construction of linear facilities. The transmission line would also border, and encroach upon the Rand Mountain Management Area ACEC and construction of the transmission line could affect tortoise adjacent to Garlock Road.

Burrowing Owl

Although the CNDDB database does not show any record of the burrowing owl at the Garlock Road Alternative site, it has been observed nearby and could move onto the

alternative site at any time. Burrowing owl survival can be adversely affected by human disturbance and foraging habitat loss, even when impacts to individual owls and burrows are avoided.

Migratory/Special Status Bird Species

The Garlock Road Alternative site provides foraging, cover, and/or breeding habitat for migratory birds, including special-status bird species that may be present at the site. Project construction and operation could impact nesting birds in violation of the Migratory Bird Treaty Act. Preconstruction surveys and avoidance of nesting birds could reduce such impacts.

Spread of Noxious Weeds

Construction of a solar facility at the Garlock Road Alternative site could result in the introduction and dispersal of invasive or exotic weeds to adjacent native habitats. The permanent and temporary earth disturbance adjacent to native habitats increases the potential for exotic, invasive plant species to establish and disperse into native plant communities, which leads to community and habitat degradation. A weed reduction program could potentially reduce and mitigate impacts.

Noise

Noise from construction activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the alternative site. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction, operations, and demolition activities could reduce the reproductive success of nesting birds.

Operational Impacts

Since there is the potential for wildlife movement to occur across the site, development and fencing of the Garlock Road Alternative site would impact wildlife that use the site as a connector to surrounding areas of higher quality habitat. The resultant fragmentation that could occur if the RSPP project is built at the Garlock Road Alternative site could lead to reduced reproductive success, increased adverse edge effects on adjoining lands, and overall reduction in the area's carrying capacity to support wildlife species. Any wildlife residing on this site would potentially be displaced, injured, or killed during project activities. Animal species in the project area could fall into construction trenches, be crushed by construction vehicles or equipment, or be harmed by project personnel. In addition, construction activities may attract predators or crush animal burrows or nests.

Operation of the transmission line could result in increased avian mortality due to collision with new transmission lines. Mitigation could include installing the transmission line in accordance with the Avian Powerline Interaction Committee (APLIC) Guidelines designed to minimize avian-power line interactions.

Comparison to Proposed Project

Overall, development of a solar project at the Garlock Road Alternative site would likely impact fewer biological resources compared to the proposed RSPP site since

development of the Garlock Road Alternative site would occur predominately on disturbed land that lacks the unique ecological characteristics and high concentration of desert tortoise found at the proposed site.

In contrast, development of the RSPP site would occur entirely on land supporting native vegetation communities. The entire southern portion of the proposed RSPP project falls within the Mohave Ground Squirrel Conservation Area. Mohave ground squirrel would not be expected at the Garlock Road Alternative site given the nature of the site. The RSPP site is known to support five special status species (desert tortoise, Mohave ground squirrel, western burrowing owl, loggerhead shrike and Le Conte's thrasher) one of which, the desert tortoise, is state and federally listed. In addition, the Mohave ground squirrel is state listed. The Garlock Road Alternative site has the potential to support all of the animal species that are present on the RSPP site except Le Conte's thrasher because the habitat is not appropriate for the species.

The Garlock Road Alternative has fewer on-site biological constraints than the proposed RSPP site, since it is mainly fallow agriculture land. The siting of a transmission line along Garlock Road would encroach upon the RMMA ACEC but impacts to tortoise would be temporary and mitigable. Increased truck traffic along Garlock and Redrock-Ransburg Roads during construction could temporarily increase vehicle-related tortoise mortality.

Cultural Resources

Environmental Setting

The Garlock Road Alternative is located on agriculture land, in Kern County, California. The alternative site is located in the western Mojave Desert approximately 1.2 miles south of the site of Garlock, a former railroad station situated in the eastern Fremont Valley approximately 22 miles northeast of California City. One-half mile to the southwest is the eastern edge of Koehn Dry Lake. The California desert has been inhabited for at least 8,000 to 12,000 years and perhaps as much as 16,000 years (Rosenthal et al. 2007, p.151). Prehistoric settlement was often centered around lakes, now the dry playas characteristic of the Mojave Desert and Great Basin. The lakes and the marsh environments along the lake shores supported abundant plant and animal species that provided food, fiber, medicine, tool materials, clothing, and ritual objects required for daily life (Schaefer and Laylander 2007). In the immediate vicinity of the Garlock Road Alternative, archaeological remains at Koehn Dry Lake, and further southwest at Cantil have revealed significant habitation during the late Holocene (Sutton et al. 2007).

From 8,000 to 6,000 years before present, climatic change caused the lakes to dry, and food gathering and land use patterns began that continued into the historic period, including the use of a greater variety of habitats, plants, and animals (Sutton et al. 2007). The bow and arrow may have appeared around 2,000 years ago as shown by a shift in projectile point form and size, and the arrival of bow-and-arrow technology is thought to be reflected by the late prehistoric introduction of the Desert Side-Notched and Cottonwood Triangular points found through the California desert (Sutton et al. 2007). Evidence from CA-KER-875 at Koehn suggests that the late prehistoric was

marked by gradual desiccation as reflected in the prehistoric use of juniper as fuel at Koehn Lake, a tree that is no longer present in the immediate region (Sutton et al. 2007, p.241).

The first documented exploration of the Mojave Desert by nonindigenous people occurred in 1770s by Francisco Garces, a Spanish Franciscan priest looking for a route from Arizona to Northern California. Much of the history of this region occurred through its use as a corridor, one used by fur trappers and caravans. California was annexed in 1848, the same year that gold was discovered, leading to an influx of prospectors. Roads were established to transport goods, people, livestock, food, and ore between the Mojave Desert and Los Angeles, and the western Mojave Desert began to have a large mining industry.

Railroad surveys began in 1853; the San Pedro, Los Angeles, and Salt Lake Line, predecessor to the Union Pacific through the Mojave Desert, was completed in 1905, and the Tonopah and Tidewater finished its line from Ludlow to Beatty, Nevada, in 1907. In 1914, a road was completed to parallel the tracks of the Atlantic & Pacific Railroad, which was the precursor to U.S. 66 (National Trails Highway).

Military bases were established in the desert in association to World War II, including Naval Air Weapons Station – China Lake and Fort Irwin.

Evidence from aerial photographs indicates that the entire Garlock Road Alternative site has been under irrigated cultivation for some time. The area lacks characteristic desert scrub of areas less subject to disturbance. In addition, the presence of radial irrigation systems suggests agricultural use after circa 1960. The radial irrigation method was invented and developed in Nebraska during the late 1940s. Until the late 1950s the method was largely restricted to the upper Midwest (http://en.wikipedia.org/wiki/Irrigation#Center_pivot_irrigation).

A records search for the Garlock Road Alternative site was conducted on January 15, 2010 by staff at the Southern San Joaquin Valley Information Center of the California Historical Resources Information System. The records search was carried out at the request of AECOM of San Diego, California. The research included a one-mile buffer surrounding the GRA site. The record search reveals that the region around the GRA is primarily unsurveyed and recorded archaeological remains are infrequent. A summary of the records search results was prepared by AECOM staff in February 2010 (SM 2010j).

The records search identified three prior studies within or adjoining the Garlock Road Alternative site and five previously recorded sites within one mile. The reports include Wilke (1983), Ridgeway and Garfinkel (1984) and Richards (2003). Sites in the Garlock Road Alternative search area include P-15-191 (a bedrock milling station and trail), P-15-882 (temporary camp site), P-15-3366 (Mojave-Owenyo Southern Pacific line), P-15-12174 (milling stone scatter), and P-15-13303 (CA-KER-7499H, a historic dump). All recorded resources are located north or west of the Garlock Road site. Surveyed land within the buffer area is too limited to estimate site density. Two linear surveys are

mapped to the north and east, one of which located an historic can dump (P-15-13303) adjacent to the northeastern corner of the Garlock Road site (Ridgeway and Garfinkel 1983).

During research in preparation of the present document, historic maps of the project region were consulted and one potential historical resource in the western portion of the Garlock Road Alternative site was identified. The 1915 edition of the United States Geological Survey *Searles Lake* 1:250,000 scale one-degree quadrangle appears to locate Garlock west and south of the present site. A location presently mapped as “Old Garlock” by the National Geospatial Intelligence Agency, is cited from the Saltdale 1:50,000 USGS quadrangle dated 1947 (USGS 2010). The modern site of Garlock is 3.2 miles northeast of the location of “Old Garlock.” This historical change suggests that there may be a potential for historical archaeological resources within the northwest portion of the Garlock Road Alternative site.

The available information on the occurrence of both prehistoric and historic archaeological sites is too scant to estimate probabilities for encountering resources within the Garlock Road site. Satellite imagery accessed via Google Earth suggests that one or more ancient beach lines may have traversed what is now the southwestern portion of the site. These lines, if they are indeed shore lines from ancient beaches may indicate a potential for prehistoric sites with the Garlock Road Alternative area.

On February 28, 2010 a windshield survey of the Garlock Road Alternative site was made by personnel of PAR Environmental Services, Inc. The visit found that access to the site is limited with poor roads and limited visual access. The site presently exhibits at least four and possibly seven structures. These appear to be mostly modern structures but based upon satellite imagery available on Google Earth, one older structure may be present at the location of Old Garlock in the northwest corner of the Garlock Road Alternative site.

Environmental Impacts

The construction and operation of a solar facility on the site of the Garlock Road Alternative would appear to have the potential to affect the site of Old Garlock, and possibly one historic archaeological site (CA-KER-7499H), an historic can dump that may extend into the Garlock Road Alternative area. Vertical disturbances may extend as much as four meters (13 feet).

The potential to affect prehistoric resources by constructing the Garlock Road Alternative is indeterminate. Because of the history of agricultural use of the entire site there is little potential for intact prehistoric or historic surface manifestations. As noted previously satellite imagery indicates that 100% of the site has been subjected to surface alterations related to agricultural operations. Typical agricultural tilling patterns and implements affect soil profiles to depths of four to 12 inches. Deeper plowing and ripping, to break up hardpan formations for example, may extend to depths of four feet or more. The location of the alternative makes it possible that buried resources associated with Middle and Late Holocene high-shore lines of Koehn Lake may be present, particularly in the southern and western portions of the area. Geoarchaeological studies conducted for the Beacon Solar Energy project 12 to13 miles southwest of the Garlock Road Alternative site found Holocene period

archaeological materials at depths of up to nearly four meters in some landforms. The investigators found that in general site accumulation tended to correlate with surfaces that reflect climatically stable, well watered periods with extended pooling periods on the playas (Young 2009).

One historical property, the site of Old Garlock, may be present within the Garlock Road Alternative site; however without access to the location, this cannot be verified. The resolution of this issue would require further study.

Built environment, besides Old Garlock, includes several structures around the Garlock Road Alternative including quarters for ranch staff and shelters for hay or other ranch products. These appear less than 50 years of age.

Comparison to Proposed Project

The development of a solar facility on the site of the Garlock Road Alternative would most likely have cultural resource impacts of less extent than the RSPP site, based upon the available survey data. The extensive surface disturbance suggests that additional effects to archaeological resources may be limited. The lack of proximity to other known properties implies that visual impacts may also be limited.
In contrast, the proposed RSPP site has no built environment issues. However, the RSPP site's ground surface has not been subjected to agricultural use. Isolated resources and archaeological sites identified within the RSPP site retain spatial patterning, material culture attributes and relative contextual data. As such, the resource base at the RSPP site allows for interpretation regarding general patterns of prehistoric and historic land use in the area through time and across the landscape and contains significant resources that appear to be lacking in the Garlock Road Alternative site.

Hazardous Materials

Environmental Setting

The topography of the Garlock Road Alternative site is essentially flat, with surrounding mountainous terrain the west and north. The nearest known population centers are roughly nine miles east of the Garlock site (Johannesburg and Randsburg), the town of Garlock is less than two miles north of the proposed site, but is considered a ghost town. There are isolated structures on the site, as well as in and around the town of Garlock, but it is unclear if they are occupied.

Access to the Garlock Road Alternative site from the east or north would likely be via SR 395 to the Garlock Road exit and from the south or southwest would likely be SR 14 to the Redrock-Randsburg Road junction. Transport would likely travel west onto Garlock Rd or north on Redrock-Randsburg Road to arrive at the site

Environmental Impacts

Hazardous materials use at the Garlock Road Alternative site, including the quantities handled during transportation and disposal, would be the same as those of the proposed RSPP project. As stated in the **HAZARDOUS MATERIALS** section in this SA/EIS, hazardous materials used during the construction phase of the RSPP would include gasoline, diesel fuel, motor oil, lubricants, welding gases (e.g., acetylene,

oxygen and argon), and small amounts of solvents and paint. Similar materials and quantities would be expected at the Garlock Road Alternative. Similar to the RSPP project, it is expected that propane would be stored onsite, given the remote location of the Garlock site.

Hazardous materials used during operations would include the solar heat transfer fluid (Therminol VP-1™, a synthetic hydrocarbon), propane, compressed gases (acetylene, argon and oxygen), diesel fuel, mineral insulating oil, and lube oil. Similar quantities to the RSPP project would be expected. None of these materials would pose a significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical states, and/or their environmental mobility given conditions of certification stipulated in the **HAZARDOUS MATERIALS** section of the SA/DPA/DEIS. Transportation of hazardous materials to the Garlock Road Alternative site could require passing near residences located in the towns of Johannesburg and Randsburg. The transportation would be primarily on SR 395 and Garlock Road and would avoid smaller roads with residences.

Comparison to Proposed Project

The hazardous materials used at the Garlock Road Alternative site would be the same as those used at the proposed RSPP site. The proposed site has four sensitive subgroups within a three-mile radius with the nearest residential receptor located approximately 3,200 feet west of the northwestern boundary of the Northern solar field. The nearest known sensitive receptor (school) at the Garlock site is nine miles east of the site. The Garlock Road Alternative would not require that heat transfer fluid (HTF) be moved across a public road. For the RSPP project, the HTF lines would be aboveground within the two solar fields but would be underground as the lines approach Brown Road. With adoption of the proposed conditions of certification, similar to the RSPP project, the Garlock Road Alternative would comply with all applicable LORS and result in no significant impacts to the public.

Land Use

Environmental Setting

The Garlock Road Alternative comprises approximately 2,100 acres of private fallow agricultural land near Garlock (ghost town), southwest of Ridgecrest, Kern County. The Garlock Road Alternative site occurs in the bottom Fremont Valley and slopes gently to the southwest toward Koehn Lake (dry). Elevation at the site ranges from 1,960 to 2,200 feet above mean sea level. There are a few isolated structures/residences onsite, as well as a handful of residences in the town of Garlock to the north of the site. It is unknown if they are occupied. The proposed location of Beacon Solar Energy Project is roughly 12 miles southwest of the Garlock site; this proposed project is a 250 MW solar parabolic trough facility proposed on 2,012 acres. In addition, the Honda Proving Center, a 7.5 mile automotive testing track, is located approximately nine miles southwest of the Garlock site, near the town of Cantil. A Southern Pacific Railroad line runs north of the Garlock site in a southwest to northeast direction.

Agriculture

The Garlock Road Alternative site has a Kern County General Plan land Use designation of A and A1 (Exclusive and Limited Agriculture) (Kern County 2010) and consists almost primarily of historic agricultural operations and fallow agricultural fields. The site is surrounded largely by undisturbed, native vegetation communities. Parts of the site are seismic and flooding hazards zones (Kern County 2010).
The California Department of Conservation (CDOC) has designated this land as primarily Vacant or Disturbed Land followed by Grazing Land (CDOC 2008). The United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) provides information on designation of soils in areas with agricultural lands (USDA 2009). Because none of the site has been surveyed by the NRCS, the California Agricultural Land Evaluation and Site Assessment (LESA) Model could not be used to assess impacts to agriculture from use of the Garlock Road Alternative site.

Sensitive Land Uses

It is unclear if the existing structures on the Garlock site are inhabited; the western portion of the site is zoned Limited Agriculture-Mobile Home Combining (Kern County 2010) and would allow habitation. If a project were located on the Garlock Road site, existing structures would be removed. The towns of Johannesburg and Randsburg are located approximately nine miles east of the Garlock Road site. There are three schools located in Johannesburg with one school roughly nine miles southwest of the site. The transmission line interconnection would run east, following Garlock Road to the immediate south until the interconnection point just west of Goler Road. Staff's site visit on January 5, 2010 indicated there were a few isolated structures along this stretch of Garlock Road, but it is unclear if they are occupied.

Transmission Interconnection

As stated above, the Garlock Road Alternative site would require approximately eight miles of new 230 kV transmission line to reach the existing SCE 230 kV line adjacent to Highway 395. The transmission line would follow Garlock Road to the immediate south and interconnect just west of Goler Road, where the existing 230 kV line crosses Garlock Road. The existing SCE 230 kV transmission line is within the area covered by the CDCA Plan. The Energy Production and Utility Corridor Element of the CDCA Plan established a network of joint-use planning corridors intended to meet the projected utility service needs at the time the Plan was written. The transmission line would be developed mainly within the Garlock Road right of way (ROW), with a small segment would occur along the Redrock-Randsburg Road ROW. The transmission line would cross both private and BLM land (including the RMMA ACEC). This area is not within the CDCA planning area designated utility corridor N; therefore a Plan Amendment could be required for this transmission line interconnection, in addition to easement acquisition where the transmission line would cross private land.

Environmental Impacts

Consistent with the desire to use disturbed lands for large solar projects, the Garlock Road Alternative site is located on inactive agriculture lands. The Garlock Road Alternative site is not considered Prime Farmland or Farmland of Statewide Importance (CDOC 2008). According to the Kern County GP, designations A and A1 permit solar

fields in excess of one acre as a conditional use. Although DOC and USDA have not designated this site as Farmland, it could be considered Farmland of Local Significance. The Energy Element of the Kern County General Plan states that one of the County's Goals is to encourage solar development in the desert and valley on previously disturbed lands and to discourage developed on undisturbed land, thus supporting State and federal protected plant and wildlife species. Because the alternative would avoid any actively farmed areas, the conversion of the previously farmed land to an industrial use would not be considered significant.

In order to rezone the Garlock Road site to an electric generating facility, the project would need to comply with local development regulations. Chapter 19.12 of the Kern County Zoning Ordinances requires a Conditional Use Permit and environmental review for such a conversion (Kern County 2009). Several of the parcels also have non-renewal Williamson Act contracts. Conversion from farmland is allowed when the nine-year non-renewal contract expires; termination of the contract prior to expiration requires cancellation procedures (CDOC 2008).

Construction activities (i.e., heavy construction equipment on temporary and permanent access roads and moving building materials to and from construction staging areas) for the alternative would create temporary disturbance to remote areas. Conditions of certification to reduce noise and air quality impacts are presented in the **NOISE AND VIBRATION** and **AIR QUALITY** sections of this SA/DPA/DEIS for the proposed RSPP site. Similar conditions of certification would be expected for a project at the Garlock Road site. Because construction disturbances would be temporary, the impacts would be less than significant.

Comparison to Proposed Project

Use of the Garlock Road Alternative site would eliminate most impacts to BLM land since the site is privately owned; however, the transmission line interconnection would require a CDCA plan amendment since it would be located on BLM land, similar to the Plan amendment that would be required for the proposed RSPP project. The transmission line ROW acquisition would likely be more difficult for the Garlock Road Alternative site. The use of the Garlock Road site would allow continuation of OHV activity, camping and astrological viewing at the RSPP site.

The Garlock Road Alternative site would convert up to 2,200 acres of vacant and fallow agriculture land to industrial use (i.e., renewable energy production), while the RSPP project would convert undisturbed desert habitat to industrial use. The proposed RSPP site is designated Non-Agriculture and Natural Vegetation by the CDOC (2008).

Sensitive receptors are located at a further distance (nine miles) as compared to the RSPP site (three miles).

The Garlock Road site would have fewer land use impacts than the proposed RSPP site.

Recreation and Wilderness

Environmental Setting

The Garlock Road Alternative site would be located on fallow agricultural land that is zoned Agriculture (Kern County 2010). No recreational land is located on the Garlock Road alternative site; however, the Rand Mountains Management Area (RMMA) and the Western Rand Mountains ACEC surround the site to the north, east and south. This area is known as the BLM Rand Mountains Fremont Valley Management Area (BLM 2008). The Fremont Kramer DWMA surrounds the site to the north, east and north. South and east of Koehn Lake is the Desert Tortoise Research Natural Area. Within the RMMA are several designated off-road vehicle (ORV) routes, and campgrounds. The El Paso Mountains are located west of the proposed site and include a number of off road trails (e.g., Last Chance Canyon, Mesquite Canyon, and Goler Canyon). Red Rock Canyon State Park is a 27,000 acre park within the El Paso Mountain range and is located approximately five miles west of the Garlock Alternative site. There are two preserves within the park: Hagen Canyon Natural Preserve and Red Cliffs Natural Preserve.

Environmental Impacts

A solar facility at the Garlock Road site would not directly impact land use nor would it displace any existing recreation uses. No designated ORV trails run through the Garlock Road Alternative site. A solar project at the Garlock Road site would be visible from the southeast portion of the Red Rock Canyon State Park. Some proportion of recreational users may ultimately prefer to visit other areas due to the changed viewshed presented by a 250 MW solar facility at the Garlock Road Alternative site.

Comparison to Proposed Project

Recreational lands are located adjacent to the Garlock Road Alternative site, but the site itself does not support recreational uses. Within the RSPP project site, northwest of the intersection of U.S. Highway 395 and Brown Road is the location of a rocky knoll that is used as a recreational destination for picnics and ORV use (SM 2009a). Scoping comments indicate that the RSPP site is utilized by RV clubs as a yearly family gathering location, with anywhere from 50 to 90 families attending the outings (PUBLIC 2010k). The categorization of the RSPP site as “multi-use land”, its location within the El Paso Mountains region of the West Mojave Off-Road Vehicle Designation Project, and its designation as a Limited Use Area for ORV (SM 2009a), suggest that recreational impacts at the proposed Ridgecrest City site would be greater than at the Garlock Road Alternative site.

Noise and Vibration

Environmental Setting

A solar project at the Garlock Road site would add a dominant noise source in a remote area; the nearest large noise generators are near Cantil to the southwest and Randsburg/Johannesburg to the east. Existing onsite structures would likely be removed prior to development, leaving few residential receptors, if any at all. Existing ambient noise sources could come from vehicles traveling along Garlock Road and

Redrock Randsburg Road and ORV users. Nearby sensitive receptors are nine miles to the east in the towns of Johannesburg and Randsburg and nine miles south in the town of Cantil.

Environmental Impacts

As discussed in the **NOISE AND VIBRATION** section of this SA/DPA/DEIS, the construction of the RSPP plant would create noise or unwanted sound and would be the same if the project were built at the Garlock Road Alternative site. The character and loudness of this noise, the times of day or night at which it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts. The Garlock Road site could possibly be heard by users of the BLM Rand Mountains Fremont Valley Management Area, which surrounds the site the north, east, and south. No other noise or vibration impacts would be expected.

Comparison to Proposed Project

Building a 250 MW solar facility at the RSPP site would create a slightly greater impact than at the Garlock Road Alternative site because of the closer proximity to a greater number of sensitive receptors (residences).

Public Health and Safety

Environmental Setting

The Garlock Road Alternative site is located in an isolated area primarily dedicated as open space and wilderness. There are no community facilities with sensitive receptors, such as schools, hospitals or playgrounds within three miles of the Garlock Alternative site. A few isolated structures within the town of Garlock and along Garlock Road and Redrock-Randsburg Road may be occupied.

Environmental Impacts

While the meteorological conditions and topography at the site differ from the RSPP proposed site, it is expected that the results of air dispersion modeling and a human health risk assessment for the Garlock Road Alternative site would be similar to that of the proposed site. The cancer risk and hazard indices are much below the level of significance at the point of maximum impact, so the project would be unlikely to pose a significant risk to public health at the Garlock Road Alternative site.

Public comments on the proposed RSPP project have expressed concerns about the potential for windblown dust from the project affecting nearby receptors. Valley fever (Coccidioidomycosis) is a fungal disease that occurs in southwestern US, northern Mexico and some places in Central and South America. The fungus that causes the disease (*Coccidioides immitis*) is normally soil-dwelling, unless the soil is disturbed, at which time the fungal spores become airborne and can infect a host if inhaled. The fungus only occurs in the top few inches of soil. Kern County has experienced more cases of Valley Fever and Valley Fever-related deaths than any other county in the United States (CHCF 1997). Dust storms, high winds and secondary dust creating activities like soil disturbing activities that occur on previous undisturbed soils (e.g.,

earth moving, earth tilling and OHV use) are all known causes of Valley Fever transmission. Both the RSPP project site and the Garlock Road Alternative site would require grading of the land. However, the Garlock Road site is already disturbed and there are few nearby receptors.

Comparison to Proposed Project

Given the proximity of sensitive receptors within a three mile radius of the RSPP site and the potential for winds to carry Valley Fever to receptors, public health and safety impacts would be reduced at the Garlock Road Alternative site.

Socioeconomics and Environmental Justice

Environmental Setting

Like the proposed RSPP site, the Garlock Road Alternative site is located in Kern County. The demographic characteristics of Kern County are described in the **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE** section of the SA/DPA/DEIS.

Environmental Impacts

Because of the limited population in the towns of Johannesburg, Randsburg and Cantil, construction workers would most likely be from larger nearby cities such as Ridgecrest and California City and locations beyond. Given the limited housing in the towns of Johannesburg/Randsburg and Cantil, workers could most likely commute to the Garlock Road site from Ridgecrest (27 miles north) and California City (26 miles south). An option would be to construct temporary housing in the immediate area of the Garlock Road Alternative site. However, temporary housing would encroach on BLM land, would increase construction impacts and would require provision of additional services such as electricity, water, waste removal, and food. Because it is unlikely that construction workers would relocate to the city of Johannesburg/Randsburg, the Garlock Road Alternative would not cause a significant adverse socioeconomic impact on the area's housing, schools, police, emergency services, hospitals, and utilities.

There would be no adverse socioeconomic impacts because most of the construction and operation workforce is within the regional labor market area, and construction activities would be short-term. Benefits from the 250 MW RSPP project, should it be built at the Garlock Road Alternative site, are likely to be similar to the benefits from the RSPP project in the Ridgecrest City region. These include increases in sales taxes, employment, and income for Kern County.

Comparison to Proposed Project

Constructing the 250 MW RSPP project at the RSPP site would result in fewer miles travelled by local workers commuting to the site, since the city of Ridgecrest is roughly five miles northeast of the proposed RSPP site. A longer commute would be expected for workers from California City. Overall, the socioeconomic impacts of the RSPP project at the Garlock Road Alternative site would be similar to building and operating the project at the proposed RSPP site.

Soil and Water Resources

Environmental Setting

The Garlock Road Alternative site is located within the Koehn sub-basin of the Fremont Valley Groundwater Basin. The Koehn sub-basin is bounded by the California City sub-basin to the southeast, the Chaffee sub-basin to the south and the Oak Creek sub-basin to the southwest (BS 2008a, Figure 5.17-1). The physical boundaries of the Koehn groundwater sub-basin include the Randsburg-Mojave Fault and Rand Mountains to the south; the El Paso Mountains to the north; the Sierra Nevada Mountains to the west; and the confluence of the El Paso and Rand Mountains to the northeast (Weir et al. 1965, Bloyd 1967, DWR 1968, Moyle *et.al.*1985, DWR 2003).

Large scale alfalfa farming began within the Koehn sub-basin in the mid-1950s and extended through the mid 1980s. During this time, groundwater pumping lowered the water table several hundred feet, which formed a large groundwater depression and caused land subsidence within the sub-basin. Due to the lowered groundwater elevation, pumping costs increased to a point that farming was no longer profitable and most farming operations ceased (BS 2008a). Depth to groundwater varies throughout the sub-basin and ranges from more than 300 feet deep away from Koehn Lake to as shallow as approximately 14 feet deep in the immediate vicinity of the lake.

Groundwater quality in the Koehn sub-basin also varies spatially in relationship to the lake. Beneath Koehn Lake, the Total Dissolved Solids (TDS) concentration of the groundwater is as high as 100,000 mg/L (Dockter 1979, DWR 2003); TDS concentrations at the upstream Garlock site would be slightly decreased. However, TDS levels have limited agricultural activities at the Garlock site.

It is highly unlikely that groundwater at the Garlock Road site would be suitable for domestic use, which requires a TDS level below 1000 mg/l, with a recommended limit below 500 mg/l (Cal. Code Regs., tit. 22, §§ 64431, 64449). When TDS levels are suitable for domestic use, the Energy Commission and the State Water Resources Control Board (SWRCB) require consideration of alternate water sources.

Soils in the Garlock Alternative site are primarily Rosamond, Gila, and Cajon. The Rosamond series consists of deep, well drained soils. The Gila series consists of very deep well drained soils. The Cajon series consists of very deep, somewhat excessively drained soils (Helix 2010).

The surrounding communities of Randsburg, Johannesburg and Red Mountain are served by the Rand Communities Water District (RCWD). As of 2004, the District provided service to approximately 280 residents in Kern and San Bernardino Counties. The District operates one primary well, one secondary well, and three booster stations (Kern County 2004).

The northwestern portion of the Garlock Road Alternative site falls within a flood zone designated by the Federal Emergency Management Agency DFIRM (Digital Flood Insurance Rate Map); parcels 154-131-09 and 154-150-06 are affected (Kern County 2010). Use of these parcels would likely require engineering measures to reduce the

risk of flooding. In addition, both Garlock Road and Redrock-Randsburg Road are subject to flooding, and closures may affect site access.

Environmental Impacts

Soil Erosion Potential by Wind and Water

As discussed in the **SOILS AND WATER** section of this SA/DPA/DEIS, construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and water-dependent habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment loading to nearby receiving waters. Although primary access to the site would be from existing roads, construction of the solar trough array at the Garlock Road site would require construction of new local access roads. The volume of earth movement required at the Garlock Road Alternative site is expected to be less since the site is relatively flat and was previously graded for agricultural uses.

The Garlock Road Alternative site is crossed by desert washes as is the proposed RSPP site, and could have erosion-related impacts from placement of solar trough arrays within and adjacent to drainage ways. Engineering controls would likely be required to reduce flooding potential. Soil erosion impacts would be relatively minor and likely mitigated by the Storm Water Pollution Prevention Plan (SWPPP), and Drainage Erosion and Sediment Control Plan (DESCP) that would be required. Due to the flat terrain and existing disturbed condition of this site, the SWPPP and DESCP would likely be sufficient to mitigate soil erosion impacts to a level less than significant.

Water Supply

The specific source of water supply for the project is unknown. The groundwater basin in the area has lowered over time and is not expected to support a 250 MW solar facility at the Garlock Road site without extensive pretreatment requirements if water were even available to a project at the site. California City and the Rosamond Community Services District have both proposed supplying recycled tertiary-treated water for the Beacon Solar Energy Project (BSEP), located near the community of Cantil just southwest of Koehn Dry Lake. If these recycled water supplies are developed, they could be also considered for the Garlock Road Site. Pipelines (perhaps in conjunction with those used for the BSEP) would be required to transport water from the wastewater treatment facilities to the site. Approximate pipeline distances would be 26 miles from California City and 48 miles from Rosamond. A water line extension from the BESP facility would be approximately 12 miles long.

Wastewater/Storm Water Quality

Storm water runoff from the site during construction and operation could have similar impacts as identified for the RSPP project. Site construction would require a SWPPP which would specify Best Management Practices (BMPs) to minimize or eliminate water contamination. Water quality impacts would likely not be significant.

Sanitary waste disposal could be through existing wastewater infrastructure if already on site, or through trucking and disposal at an approved offsite location. No adverse impact is anticipated.

Comparison to Proposed Project

The RSPP project proposes to use dry-cooling that would use approximately 150 acre-feet of groundwater per year. If the RSPP project were built at the Garlock Road Alternative site, it is anticipated that dry cooling would also be used and groundwater consumption would be similar.

Although onsite wells exist at the Garlock Road Alternative site, the TDS levels that occur in the groundwater under Koehn Lake, the historic agriculture operations onsite and historic gold mining operations that occurred in the immediate vicinity, it is likely that the well water would require extensive treatment to reach potable standards. Use of reclaimed water from either California City (26 miles) or the Rosamond Community Services District (48 miles) may be required for project operation. The proposed RSPP would install a 16.3 mile water pipeline to convey groundwater water to the site; this water would be supplied by the Indian Wells Valley Water District. Use of water from the Indian Wells Valley Water District would cause greater long-term impacts to water supply. The RSPP project would require engineered drainage channels to convey and redirect storm water as would a project at the Garlock Road Alternative site. Overall, impacts to soil and water resources at the Garlock Road Alternative site are expected to be slightly less than at the RSPP site.

Traffic and Transportation

Environmental Setting

The Garlock Road alternative site is just south of the intersection of Garlock Road and Redrock-Randsburg Road. The Redrock-Randsburg Road connects SR14 (by Cantil) to SR 395 (just north of Johannesburg). Garlock Road connects to Highway 395 just east of Rand (approximately four miles north of Johannesburg). Redrock-Randsburg and Garlock Roads are both two-lane paved roads with at-grade, stop sign controlled intersections with SRs 14 (4 lanes, undivided) and 395 (two lanes). At the intersection with Redrock-Randsburg Road, SR 395 has a northbound left turn lane and southbound right turn lane. There are no turn lanes on SR 395 at its intersection with Garlock Road or on Highway 14 at its intersection with Redrock-Randsburg Road. Garlock Road and Redrock-Randsburg Road are considered part of the northern truck route for California City (California City 2009).

Kern County's annual traffic counts (from 2005 to 2007) averaged 783 on Garlock Road north of Redrock-Randsburg Road, 1,023 on Garlock Road south of its intersection with SRs 395, and 157 on Redrock Randsburg Road east of Garlock Road (Kern County 2010a).

Transportation facilities serving the Garlock area would be similar to the proposed site. Inyokern Airport, just west of Ridgecrest, provides the nearest commercial airport service. Other airports in the region include California City Municipal Airport, Trona Airport, Mojave Air and Space Port, Edwards Air Force Base, and China Lake NAWS.

Kern Regional Transit's Mojave Ridgecrest Express offers limited Monday-Wednesday-Friday bus service between Mojave, California City, Inyokern, and Ridgecrest and between Inyokern, Mojave, and Lancaster. There is no bus service to the Garlock site. Union Pacific Railroad's Lone Pine Branch (from Mojave to Trona) passes by the site; it is unclear whether the tracks are operable. The nearest railroad siding for offloading materials or equipment is located in Mojave, 35 miles to the southwest.

Ridgecrest would likely be the largest source or workers employed to construct the project at this alternative site; workers would commute approximately 24 miles south on SR 395 and west on Garlock Road to reach the site. The construction workforce would also be drawn from the regional area, including Barstow (90 miles), Boron (53 miles), California City (26 miles), Mojave (35 miles), and Tehachapi (49 miles).

Rough unpaved roads, including Arciero-Randsburg Ranch Road, access the site; upgrades would l be required.

Environmental Impacts

During the 28 month construction period, up to 633 workers per day would commute to the site. If all workers commuted in automobiles with only one occupant per vehicle, there could be a peak of 1,266 one-way worker commute trips per day. Construction would also generate approximately 100 one-way truck trips per day, with a peak of 140 one-way truck trips during foundation construction (month 8). The applicant estimates a total operation phase workforce of 84 workers. Peak hour weekday traffic would be less than 60 vehicles even if every employee commutes alone in their own vehicle (SM 2009a p. 5.13-13 to 5.13-15). Construction traffic would likely impact traffic conditions at the intersections of Highway 14 and Highway 395. No turning lanes currently exist at Highway 395 and road improvements may be necessary. Increased vehicle traffic on Garlock Road and Redrock-Randsburg Road would occur. The potential flooding of these two roads could impact the ability of truck and passenger vehicles to access the Garlock Road site.

Similar to the proposed project, there is the potential for highly distracting diffuse glare from the project to affect nearby motorists.

Comparison to Proposed Project

Impacts to traffic and transportation at the Garlock Road Alternative site would likely be similar to those at the proposed RSPP site. Construction of the Garlock Road Alternative site would likely require improvements at the Garlock Road/Redrock-Ransburg intersection and at SR 395 while the RSPP site would require improvements to SR 395.

Transmission Line Safety and Nuisance

Environmental Setting

The Garlock Road Alternative site would require approximately eight miles of a new 230 kV transmission interconnection, compared to approximately 2.5 miles of new (0.75 mile) and rerouted (1.7 mile) transmission lines at the proposed RSPP project site. An existing 230 kV SCE transmission line is located six miles east of the Garlock Road

Alternative site; however utilizing this path would cause the transmission line to be located entirely on BLM land and on sensitive land (Fremont-Kramer DWMA, RMMA, Mohave Ground Squirrel Conservation Area and Western Rand Mountain ACEC). Instead the transmission interconnection to SCE's Kramer-Inyokern 230-kV transmission line would follow Garlock Road to the east on the south side of the road and interconnect to the existing line at its point of crossing with Garlock Road; additional private party and BLM parcel crossings would be required. A CDCA Plan amendment from BLM and easement acquisition from private land owners would be required.

Environmental Impacts

Similar to the proposed project, this alternative would be unlikely to cause transmission line safety hazards or nuisances with implementation of conditions of certification such as those described in the **TRANSMISSION LINE SAFETY AND NUISANCE** section of the SA/DPA/DEIS. The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current standard industry practices, and the potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, Section 1250, would minimize fire hazards, while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

The public health effects of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate.

Comparison to Proposed Project

The Garlock Road Alternative site would require a longer transmission line interconnection to the SCE transmission system, a CDCA Plan amendment and private land easement acquisition. The electric and magnetic fields would be managed to an extent the CPUC considers appropriate and only a limited number of structures/potential residences are located along the transmission line route. Because of the greater distance and the need for new transmission line structures, the potential impact associated with transmission lines would be greater for the Garlock Road Alternative than for the proposed site.

Visual Resources

Environmental Setting

The Fremont Valley is a flat, low-lying desert area surrounded by the mountains to the west, east and north. The Red Rock Canyon State Park is located west of the site where the southernmost tip of the Sierra Nevada converges with the El Paso Range. The park encompasses 16,600 acres of scenic desert cliffs, buttes and rock formations. Miles of public trails wind through the park. SR 14, a four-lane highway, is the major transportation system within the Fremont Valley. SR 14 is not listed as a scenic highway by the California Department of Transportation (Caltrans).

Much of the Garlock Road Alternative site is currently vacant farmland and some farm-related auxiliary structures. The nearest known population centers (Johannesburg and Randsburg) are roughly nine miles east of the Garlock site. The town of Garlock is less than two miles north of the proposed site, but is considered a ghost town. There are isolated structures on the site, as well as in and around the town of Garlock, but it is unclear if they are occupied. Viewer concern of the project should it be developed at the Garlock Road Alternative site would be moderate. The number of residential viewers represented in this view is low.

Environmental Impacts

For the Garlock Road Alternative site, a visual impact analysis would be based on a comparison of the area's visual sensitivity with the industrial features added by the solar project. With the addition of a 250 MW project, views of the rural landscape would be increasingly industrial. Views would be dominated by roughly three square miles of mirror-arrays, graded areas, as well as light rays reflected off ambient atmospheric dust. There would be no natural features to block the view of the solar facilities on any side of the site.

The site would be prominently visible from Garlock Road and Redrock-Randsburg Road, for both northbound and southbound traffic. Travelers would see the site from a distance and there is little elevation or natural contouring that would block the solar facilities on the alternative site.

As previously mentioned, there are parks and recreation areas in the immediate vicinity. Should the Garlock Road site be developed, visitors to these destinations could experience an unsatisfying visual experience given the industrial nature of a solar thermal facility. With minimal surrounding development, a project at this site would develop an otherwise vacant desert landscape. Redrock-Randsburg Road is slightly elevated above the site, and a solar thermal facility would likely be visible to motorists traveling in both directions. It could also be visible to users of designated offroad routes in the BLM Rand Mountains Fremont Valley Management Area.

The linear facilities associated with the Garlock Road Alternative site would include a 230-kV transmission line approximately eight miles long. The transmission interconnection to SCE's Kramer-Inyoken 230-kV transmission line would be visible to viewers along Redrock-Randsburg road and Garlock Road, in addition to the RMMA and Western Rand Mountains ACEC. There are also a number of offroad trails in the El Paso Mountains including Last Chance Canyon, Mesquite Canyon, and Goler Canyon. There is the potential for the site to be visible from the southeast portion of the Red Rock Canyon State Park

Comparison to Proposed Project

Fewer viewers would see a solar facility at the Garlock Road Alternative site and a solar facility at this location would not impact viewsheds associated with historic tribal activities, as would a solar facility at the proposed RSPP site. Additionally, the RSPP site has four sensitive subgroups within a three-mile radius with the nearest residential receptor located approximately 3,200 feet west of the northwestern boundary of the

Northern solar field. As a result, a large solar project on the RSPP area would create a more dramatic change to the visual environment than would occur at the Garlock Road Alternative site.

The interconnection transmission line at the Garlock Road Alternative site would be longer than at the proposed RSPP site but would be located in an already disturbed area (Redrock-Randsburg Road and Garlock Road right of way) to the greatest extent feasible,. However, given the lines proximity to the RMMA ACEC, the visual impact of the transmission line would be greater at the Garlock Road Alternative site. Overall, visual impacts would be expected at both sites.

Waste Management

Environmental Setting

As discussed in the **WASTE MANAGEMENT** section of this SA/DPA/DEIS, the 28-month construction period would generate 8,500 cubic yards (non-hazardous) and 31,000 cubic yards (hazardous) of solid and liquid wastes, including wastewater. Operation of the solar facility would generate 31,000 cubic yards or more of non-hazardous wastes over a 30-year operating lifetime. Up to 790 cubic yards of non-recyclable hazardous waste would be generated over the 30-year operating lifetime; however a portion of this quantity could be recovered (oil absorbent and oil filters) or treated (HTF contaminated soil) and not require landfill disposal. Waste would be recycled where practical and nonrecyclable waste would be deposited in a Class III landfill.

Similar waste quantities would be expected from construction and operation of a solar facility at the Garlock Road Alternative site. However, the presence of unexploded ordnance (UXO) would not be expected at the Garlock Road site in contrast to the RSPP site, where proximity to military operations has resulted in observed UXO at the site.

Seven Class III waste disposal facilities in Kern County could potentially accommodate the non-hazardous construction and operation wastes generated by the proposed project. Their combined remaining capacity is over 66.6 million cubic yards (SM 2009a page 5.16-9). Project operations would generate hazardous wastes including: used hydraulic fluid, oils, and grease associated with the HTF system, turbine, and other hydraulic equipment; effluent from the oily water separation system resulting from plant wash down; oil adsorbent and oil filters; spent carbon from air pollution control of the HTF vent; soil contaminated with HTF as a result of solar array equipment leaks; and spent lead acid batteries. The two Class I landfills that accept hazardous wastes in California are the Clean Harbor Landfill (Buttonwillow) in Kern County and the Chemical Waste Management Landfill (Kettleman Hills) in Kings County (SM 2009a). The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is a combined excess of 10 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with at least 30 years remaining in their operating lifetimes (SM 2009a, page 5.16-10).

Environmental Impacts

Both nonhazardous and hazardous wastes would be created by the construction of the 250 MW RSPP project at the Garlock Road Alternative site in similar quantities as at the proposed site and would be disposed of at appropriate facilities. The applicant would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction and would be required to comply with conditions of certification similar to those identified for the proposed site.

All construction and operation activities would need to be conducted in compliance with regulations pertaining to the appropriate management of wastes. The total amount of nonhazardous waste generated from the RSPP is estimated to be 70 cubic yards of solid waste per week from construction, and approximately 20 cubic yards per week from operation. The disposal of the solid wastes generated by a solar facility at the Garlock Road Alternative site can occur without significantly impacting the capacity or remaining life of Kern County disposal facilities.

Like nonhazardous wastes, hazardous wastes would be recycled to the extent possible. The 2 cubic yards per week of construction hazardous waste and the 0.5 cubic yards of operation hazardous waste requiring off-site disposal would not impact the capacity or remaining life of the Class I waste facilities. Similar to the proposed RSPP, a project at the Garlock Road Alternative site would need to implement a comprehensive program to manage hazardous wastes and obtain a hazardous waste generator identification number (required by law for any generator of hazardous wastes).

Comparison to Proposed Project

The environmental impacts of waste disposal at the Garlock Road Alternative site would be similar to those at the proposed RSPP site. However, the Garlock Road Alternative site would not require investigation and removal of UXO.

Worker Safety and Fire Protection

Environmental Setting

The Garlock Road Alternative site would be located within an area that is primarily fallow agricultural land. The area is currently served by the Kern County Fire Department. Station 75 is approximately 10 miles east of the Garlock Road site, in the town of Randsburg. Mutual aid service for police and fire emergencies is available from California City Fire Department and Edwards Air Force Base. The **WORKER SAFETY AND FIRE PROTECTION** section in this SA/DPA/DEIS provides more information regarding the Kern County Fire Department. The fire risks of this alternative site would be similar to those of the proposed RSPP site as both have desert conditions.

Environmental Impacts

A solar plant at the Garlock Road Alternative site would require a Project Demolition and Construction Injury and Illness Prevention Program and a Project Operations Safety and Health Program in order to ensure adequate levels of industrial safety. The applicant would also be required to provide safety and health programs for project construction, operation, and maintenance, similar to the requirements for the proposed project site. The Kern County Fire Department would be contacted to assure that the

level of staffing, equipment, and response time for fire services and emergency medical services are adequate. A UXO training program would not be required at the Garlock Road Alternative site.

Comparison to Proposed Project

The environmental impact of worker safety and fire protection at the Garlock Road Alternative site would be similar to that at the proposed RSPP site, with the exception of the reduced risk from no UXO expected at the site.

Engineering Assessment for Garlock Road Alternative

Facility Design

The design of a 250 MW project at the Garlock Road Alternative would be similar to that of RSPP project at the proposed RSPP site. The facility design analysis encompasses the civil, structural, mechanical and electrical engineering design of a project. It is assumed that each renewable technology would abide by the required LORS for that facility and would comply with the California Building Standards Code.

Geology, Paleontology and Minerals

Environmental Setting

The Garlock Road Alternative site lies within the geological active area of the northwestern Mojave Desert Geomorphic Province. There are two fault trends that control topography in this province, the NW-SE trend (San Andreas Fault) and a secondary east-west trend (Garlock Fault). The Garlock Fault has been active throughout the Quaternary period (USGS 2006). The Garlock Road Alternative site is located in the Fremont Valley near the northwest boundary of the Mojave Desert Geomorphic Province where it terminates against the Garlock Fault. Historic groundwater extraction in the Fremont Valley has caused subsidence and/or dilation due to pull-apart faulting between the western and central strands of the Garlock Fault and has resulted in formation of localized tension cracks and surface fissuring along stress planes parallel to the Garlock Fault system.

There are historic salt, borax, bentonite, copper and gold mines within the Garlock Road Alternative site vicinity (USGS 2010). It is unknown if important paleontological resources exist at the Garlock site; however, previous agricultural activities at the site would have reduced such potential.

Environmental Impacts

Seismic ground shaking and fissuring due to subsidence is probable at the Garlock Road site given its location near the Garlock Fault and represent the primary geologic hazards at the site. As such, design criteria would be required in accordance with a design-level geotechnical report and California Building Code (2007) standards. Adequate design parameters for the facility would need to be determined through a site-specific evaluation by a Certified Engineering Geologist or Geotechnical Engineer. Impacts due to seismic hazards and soil conditions, such as subsidence, would be addressed by compliance with the requirements and design standards of the California Building Code. The potential for liquefaction in this area is low due to anticipated depths

of groundwater; however, the water table may rise temporarily and sections of the Garlock Road Alternative site are adjacent to active river washes. As such the alternative site may be moderately susceptible to liquefaction if a strong earthquake occurs when valley floor sediments are saturated.

Comparison to Proposed Project

Similar to the proposed RSPP site, construction at the Garlock Road Alternative site would include grading, foundation excavation and utility trenching and the potential to expose paleontological resources would increase with the depth of excavations. As with the RSPP site, the proposed conditions of certification are designed to mitigate any paleontological resource impacts to a less-than-significant level. The applicant would follow all applicable building codes and standard practices for power plant construction as required by the CEC including: Title 24, California Code of Regulations, which adopts the current edition of the CBC as minimum legal building standards; the 2001 California Building Code (CBC) for design of structures; the 1996 Structural Engineers Association of California's Recommended Lateral Force Requirements, for seismic design; ASME-American Society of Mechanical Engineers Boiler and Pressure Vessel Code, and the NEMA-National Electrical Manufacturers Association.

The paleontological sensitivity and potential to encounter significant paleontological resources at this alternative site would be lower in comparison to the RSPP site. Numerous vertebrate fossil localities have been documented in the RSPP region. The Garlock Road Alternative site is subject to a greater risk of geologic hazards as compared to the proposed RSPP site. Strong ground shaking would be effectively mitigated through facility design. The conditions of certification provided in the **GEOLOGY, PALEONTOLOGY AND MINERALS** section would be applicable to the Garlock Road Alternative site. Impacts are considered to be somewhat greater at the Garlock Road Alternative site.

Power Plant Efficiency

The parabolic trough technology that would be employed at the Garlock Road Alternative would be similar to the proposed RSPP project although the plant configuration may be altered. A project at either location would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. They would not create significant adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply, and would not consume fossil fuel energy in a wasteful of inefficient manner.

Power Plant Reliability

A solar facility at the Garlock Road Alternative site would be generally similar to the RSPP site in terms of plant maintainability, fuel and water availability, and reliability of the plant in relation to natural hazards as compared to the proposed RSPP project. However, the nearby presence of the Garlock Fault and the increased potential for flooding at the Garlock Road Alternative site suggest that it would have greater impacts to power plant reliability as compared to the RSPP site.

Transmission System Engineering

Locating a solar facility at the Garlock Road Alternative site would require longer connector lines than at the proposed RSPP site but would interconnect with the same transmission line. The Garlock Road site would not require the relocation of the two existing SCE lines at the RSPP site. Overall, the transmission system evaluation for the Garlock Road Alternative site would be similar to that at the RSPP site.

Summary of Impacts – Garlock Road Alternative Site

The Garlock Road Alternative site would have impacts similar to the proposed RSPP site for 8 of the 20 environmental and engineering disciplines discussed above: air quality, hazardous materials, socioeconomics, traffic and transportation, visual, waste management, worker safety and fire protection, facility design, and transmission system engineering.

The RSPP site is preferred over the Garlock Alternative site in four disciplines: geology, paleontology and minerals; transmission line safety and nuisance; power plant efficiency; and power plant reliability. The Garlock Road Alternative site would require a longer transmission interconnection that would be adjacent to the RMMA ACEC and would require a CDCA Plan Amendment in addition to easement acquisition where the transmission line would cross private land.

The Garlock Road Alternative site is preferred over the proposed RSPP site for seven disciplines: biology, cultural resources, land use, recreation, noise and vibration, public health and safety, and soils and water. Impacts to biological and cultural resources are anticipated to be reduced at the Garlock Road Alternative site compared to the RSPP site because the Garlock Road Alternative site would be located on disturbed land. This would lessen the amount of sensitive species habitat that would be lost due to the construction of the project and would potentially lessen impacts to cultural resources.

The Garlock Road Alternative Site is comprised of approximately 11 parcels with 6 private land owners. The largest quantity of land, 6 parcels encompassing 1,523 acres, is owned by one land owner who has indicated that this land may be available for sale, increasing the feasibility of acquiring the Garlock Road site as a potential solar facility. However, known flooding at the site may reduce the feasibility of a solar project at this location.

B.2.7.3 SOLAR PHOTOVOLTAIC TECHNOLOGY – UTILITY SCALE ONSITE ALTERNATIVE

A utility scale solar photovoltaic (PV) power generation facility would consist of PV panels that would absorb solar radiation and convert it directly to electricity. The definition of a utility scale photovoltaic projects varies; for this analysis utility scale project would consist of any solar photovoltaic facilities that would require transmission to reach the load center, or center of use.

PV facilities have been suggested using two general technologies:

- Thin film installed on fixed metal racks, as proposed by OptiSolar, Inc. (see **Alternatives Figure 5**

- Concentrating photovoltaics installed in elevated groups of panels that track the sun. These technologies are available from companies such as SunPower and Amonix. SunPower's PowerTracker technology consists of a single-axis mechanism that rotates the PV panels to follow the sunlight. The Amonix technology allows tracking on two axes. See **Alternatives Figure 5**.

Examples of existing utility scale PV facilities are:

- El Dorado Energy (Boulder City, NV): First Solar built a 10 MW facility using thin film technology for Sempra Energy demonstrating the commercial viability of its technology. The facility consists of over 167,000 solar modules on 80 acres of land and was completed in December 2008 (Sempra 2008). Additionally, Sempra Generation will begin expanding the facility by 48 MW in January 2010. All 58 MWs would be purchased by PG&E (Sempra 2009).
- NRG Solar (Blythe, CA): NRG Solar acquired a 21 MW thin film (First Solar) PV project in Blythe, CA. Commercial operation of the facility began in December 2009 and the electricity generated by the project is being sold to SCE under a 20 year power purchase agreement (NRG 2009).

Because PV technologies vary, the acreage required per MW of electricity produced from a large solar PV power plant is wide ranging and likely to change as technology continues to develop. The land requirement varies from approximately three acres per MW of capacity for crystalline silicon to more than 10 acres per MW for thin film and tracking technologies (NRDC 2008b). Therefore, a nominal 250 MW solar PV power plant would require between 750 and 2,500 acres.

PV installation varies in its grading and ground disturbance requirements; however all technologies require some ground disturbance activities for associated buildings, access roads and transmission line interconnections. The Solargen Energy Panoche Valley Solar Farm is a proposed 1,000 MW solar PV facility located on 10,000 acres in eastern San Benito County. The solar farm would employ crystalline silicon PV technology and require grading only for access roads, the operation and maintenance facility and the site's substation (Solargen 2009). The SunPower California-Valley Solar Ranch proposed 250 MV PV facility located in San Louis Obispo County using Power Tracker technology would cause ground disturbance on 1,920 acres of the proposed 1,965 acre site (SLO 2009). First Solar Desert Sunlight Solar Farm proposed 550 MW project located in Riverside County would employ thin film PV technology and would require grading of approximately 4,103 acres of the proposed 4,410 acre site. First Solar cited reasons such as needing to create a level, compact ground floor that drains properly as sheet flow across the site (First Solar 2009). First Solar PV structures are five feet in height, while Power Tracker and crystalline silicon PV structures range from 15 to 20 feet in height.

Utility-scale solar PV installations require land with less than 3% slope. Solar PV facilities do not require water for electricity generation. Because some water is required to wash the solar panels to maintain efficiency, approximately 2-10 AFY of water is estimated to be required for a 100 MW utility solar PV installation or 5 to 25 AFY for a 250 MW installation (NRDC 2008b). The SunPower-CA Valley Solar Ranch states that the facility would use approximately 11.6 AFY for a 250 MW PV facility (SLO 2009).

Depending on the technology, solar PV arrays and inverters could range from 5 (First Solar thin film) to 15 feet (Power Tracker) high; however, some components of the solar PV facility, such as collector power lines or a transmission interconnection may be substantially taller (SLO 2009).

As with any large solar facility, additional operational components may be required. The SunPower-California Valley Solar Ranch would require operational components such as electrical equipment, collector power lines, access roads, a substation, an operation and maintenance building, and water tanks (SLO 2009).

The Environmental Setting for the Solar PV Technology - Utility Scale Alternative at the proposed site would be the same for each technical area found in the corresponding technical sections of this SA/DPA/DEIS.

Environmental and Engineering Assessment of the Photovoltaic Technology – Utility Scale Alternative at the Proposed Site

Air Quality

Environmental Impacts

Air quality impacts would principally consist of exhaust emissions from on-site, off-road and gasoline-powered construction equipment (*e.g.,* ozone precursors, NOx and VOC; other criteria pollutants, such as CO and PM10; and toxic diesel particulate matter emissions) and fugitive particulate matter (dust) from travel on unpaved surfaces. Depending on the PV technology employed, the amount of grading and soil disturbing activities carried out would contribute to air quality impacts in the form of fugitive dust.

Exhaust emissions would be caused by workers commuting to and from the work sites, from trucks hauling equipment and supplies to the sites, and crew trucks. Exhaust emissions from heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) would be essentially the same for PV utility-scale technology as for solar thermal facilities. Workers would likely come from the Ridgecrest area, roughly five miles northeast of the proposed site, and other regional locations. The project would likely be required to implement fugitive dust control measures to reduce emissions of particulate matter during construction and operation. Emissions released during operation of the solar PV facility would be limited to worker vehicles

Valley fever (Coccidioidomycosis) is a fungal disease that occurs in southwestern US, northern Mexico and some places in Central and South America. The fungus that causes the disease (*Coccidioides immitis*) is normally soil-dwelling, unless the soil is disturbed, at which time the fungal spores become airborne and can infect a host if inhaled. The fungus only occurs in the top few inches of soil. Kern County has experienced more cases of Valley Fever and Valley Fever related deaths than any other county in the United States (CHCF 1997). Dust storms, high winds and secondary dust creating activities like soil disturbing activities such as; earth moving (construction), earth tilling (agriculture), recreation (off road vehicles) that occur on previous undisturbed soils, are all known causes of Valley Fever transmission (KCHD 1995). Concerns about Valley Fever were identified in several Scoping comments for the RSPP project.

Comparison to Proposed Project

Both a solar parabolic trough and a solar PV installation at the proposed RSPP site would introduce soil disturbing activities in the form of grading, and would be required to adhere to Kern County's Zoning and Grading Ordinances (Kern 2007). However, parabolic trough technology requires grading of the entire disturbed area (1,944 acres), where as some PV technologies require only minimal grading for access roads, transmission line interconnection and ancillary facilities (e.g., maintenance buildings). Air emissions from operation of the solar thermal parabolic trough technology result from project facilities (e.g., auxiliary broiler, generator engines, auxiliary cooling tower, HTF heater and HTF ullage system). Solar PV emissions during operation would result only from worker vehicles. The air quality impacts would be greater for the proposed parabolic trough technology, given the large grading requirements and pollutants released during operation of the facility.

Biological Resources

Environmental Impacts

Development and installation of solar PV at the proposed project site could have adverse impacts to vegetation and wildlife from construction of access roads, transmission lines and any needed ancillary facilities (e.g., substation, water tank and a maintenance building). PV technologies do require level ground; however, the RSPP site has an average 2% slope throughout the site, and PV arrays can be located on areas of the site that are level and would not require grading. PV facilities can require more acreage per MW of power output. Construction of a PV project would cause both temporary (during construction from vegetation clearing) and permanent (displacement of vegetation with project features) impacts to vegetation and wildlife habitat. Construction activities may also result in the alteration of soil conditions, including the loss of native seed banks and changes in topography and drainage, such that the ability of a site to support native vegetation after construction is impaired. Desert ecosystems are especially sensitive to ground disturbance and can take decades to recover, if at all. PV facilities could require security fencing; however some projects have proposed fencing that leaves 12 inch spacing from the ground to allow wildlife to enter into the solar array areas to aid in wildlife movement (SLO 2009).

The introduction of elevated structures can create increased perching opportunities for predatory birds causing increased impacts to sensitive prey (i.e. desert tortoise, Mohave ground squirrel). Shaded areas would result on the ground from PV arrays and non-native plants could proliferate in these areas, resulting in habitat alteration. First Solar predicts that 72% of the 4,410 acres of the proposed Desert Sunlight Solar Farm site would be covered or shaded by the above ground solar modules (First Solar 2009).

Comparison to Proposed Project

As with the RSPP project, construction and operation would result in ground disturbance (possibly slightly more if additional land is required) and loss of vegetation and wildlife habitat. However, depending on the PV technology employed and associated grading requirements at the RSPP site, impacts to biological resources could be less than the RSPP project. Solargen Energy Panoche Valley Solar Farm (2009), for example, would not require grading of the entire site and would allow the

existing land use, dry grazing of sheep, to continue to occur under the 15 foot solar arrays. Solar PV arrays can be sited in irregular shapes versus parabolic troughs which require continuous land; thus PV arrays can be arranged to avoid sensitive habitat or desert washes. Solar PV technologies that do not require mass ground disturbing activities could be employed at the RSPP site and impacts to biological resources would be reduced in comparison to the proposed RSPP site.

Cultural Resources

Environmental Impacts

Known archaeological, architectural, or historical sites would potentially be affected by construction and operation of a solar PV facility. The eastern portion of the Last Chance Canyon Archeological District, which is listed on the National Register of Historic Places (NRHP), currently covers approximately one-third of the western portion of the project site. The possibility for unanticipated archeological and/or historical resources would be discovered during construction.

Comparison to Proposed Project

While the implementation of solar PV facilities at the RSPP site would result in ground disturbance and could impact known and unknown cultural resources, the facilities could be sited around known sensitive cultural resources. As such, it is likely that the solar PV facilities would create fewer impacts to cultural resources compared with the RSPP project.

Hazardous Materials

Environmental Impacts

Construction activities would require the transport, storage and use of hazardous materials for fuel and servicing of construction equipment. Soil or groundwater contamination could result from accidental spill or release of hazardous materials at the PV facility during construction activities of the power plant. This could result in exposure of the facility, maintenance workers, and the public to hazardous materials; and could result in contamination to soil and/or groundwater.

Solar PV facilities do not require hazardous materials during operation, aside from mobile sources.

Comparison to Proposed Project

The proposed solar thermal facility would require the use of the following hazardous materials. Therminol VP-1(heat transfer fluid), propane, diesel fuel, mineral insulating oil, and lube oil, among others. A solar PV facility located at the proposed RSPP site would require diesel fuel for mobile source use during construction and operation activities. The parabolic trough technology would require the use of a larger number of hazardous materials and while conditions of certification would reduce impacts, spills of HTF would be inevitable. Therefore impacts from hazardous materials would be greater for the parabolic trough technology.

Land Use

Environmental Impacts

Solar PV facilities would require more land to generate 250 MW than the proposed parabolic trough technology for the RSPP project. The amount of ground disturbance for a solar PV facility varies and depends on the PV technology used. Impacts to land use depend on the existing use of the land. For example, BLM lands within the RSPP project area are classified as 'Multiple Use Class Limited', with the remaining land unclassified. Both designations allow for solar development (SM 2009a). No sensitive land uses would be traversed by or adjacent to the RSPP site. However, the proposed RSPP site is used by off-highway vehicles and a solar facility using either parabolic trough arrays or PV panels would potentially create impacts to recreation (see the discussion of **Recreation and Wilderness** below).

Comparison to Proposed Project

Impacts to land use from a solar PV facility would be similar to land use impacts from the proposed RSPP project. Similar to the proposed project, a solar PV project on the RSPP site would require a CDCA Plan Amendment, in addition to a BLM ROW Grant. Considering the minimal amount of water needed for operation of a PV facility, installation of a water pipeline would be unlikely. Water needed for construction and operation would likely be trucked in and stored onsite.

Recreation and Wilderness

Environmental Impacts

The construction of solar arrays, staging areas, switch yards, transmission lines, and roads for solar PV facilities would reduce the amount of land available to recreationists for hiking, wildlife viewing, camping, and OHV use. Solar PV development in the area would eliminate the opportunities for OHV vehicles to access certain areas of the RSPP site during construction of operation of the solar PV facility.
Views of equipment or the addition or change of industrial structures such as pipelines, power lines, and power production facilities conflict with the natural background of recreational resources in the desert and could also diminish users' recreational experiences on lands that remain open for recreation.

Comparison to Proposed Project

As with the RSPP facility, a solar PV facility constructed on Federal land could disrupt the use of recreation and wilderness lands.

Noise and Vibration

Environmental Impacts

Construction of a solar PV facility at the RSPP site would result in elevated ambient noise levels. Construction activities, especially the use of heavy equipment for construction and grading of access roads, would be the greatest contributor to elevated noise levels. As stated above, depending on the PV technology used at the site, grading may only be necessary for the access roads and for the construction of a substation or

any operation and maintenance (O&M) facilities. The most common source of noise disturbance would come from the substation as a result of cooling fans and the resonance from vibrations of the transformer core (Solargen 2009). These noise disturbances activities would be contained within an enclosed structure onsite.

Comparison to Proposed Project

Both a solar PV facility and the RSPP facility would require use of heavy equipment which would create construction noise. Nearby sensitive receptors would experience elevated noise impacts during construction. The RSPP project would use dry cooling during operation of the project. Increased daytime noise levels are estimated to attenuate over 6,300 feet to approximately 42 decibels (SM 2009a). The nearest residential receptor at the RSPP site is 3,200 feet east of the northern solar field. Operation of the proposed RSPP project would have greater noise impacts than operation of a solar PV facility at the site.

Public Health and Safety

Environmental Impacts

The primary materials contained within the PV arrays include glass, steal and several semiconductor materials. First Solar utilizes thin film cadmium telluride (CdTe) as a semiconductor material in its PV technology. Cadmuim telluride is a stable compound of cadmium (Cd) and tellurium (Te). Cadmium by itself is a human carcinogen, produced primarily as a byproduct of zinc refining. It is compounded with Te, a byproduct of copper refining, to form the stable compound CdTe. CdTe can be recycled for use in new solar modules. A very thin layer of CdTe is encapsulated between two protective sheets of glass; therefore the risk of exposure is negligible. Furthermore, the French Ministry of Ecological, Energy, Sustainable Development, and the Sea, conducted an assessment of the environmental, health and safety aspects of First Solar's CdTe PV systems. The study concluded that there are no cadmium emissions to air, water, or to soil during the operation of standard CdTe PV systems. In the case of fire or broken panels, the study found that emissions remained negligible (First Solar 2009).

The potential for windblown dust from the project could affect nearby receptors. Valley fever (Coccidioidomycosis) is a fungal disease that occurs in southwestern US, northern Mexico and some places in Central and South America. The fungus that causes the disease (*Coccidioides immitis*) is normally soil-dwelling, unless the soil is disturbed, at which time the fungal spores become airborne and can infect a host if inhaled. The fungus only occurs in the top few inches of soil. Kern County has experienced more cases of Valley Fever and Valley Fever-related deaths than any other county in the United States (CHCF 1997). Dust storms, high winds and secondary dust creating activities like soil disturbing activities that occur on previous undisturbed soils (e.g., earth moving, earth tilling and OHV use) are all known causes of Valley Fever transmission.

Comparison to Proposed Project

Given the proximity of sensitive receptors within a three mile radius of the proposed site and the potential for winds to carry Valley Fever to receptors, public health and safety impacts would be similar for a solar PV project at the RSPP site.

Socioeconomics and Environmental Justice

Environmental Impacts

The source of construction and operation workers would be similar and the estimated benefits to Kern County would be similar for a solar PV project at the RSPP site. Construction workers would most likely be from the City of Ridgecrest and the surrounding regional area. The solar PV alternative would cause similar impacts on the area's housing, schools, police, emergency services, hospitals, and utilities as would the RSPP project. Construction of a solar PV facility would create nominal short-term employment opportunities for additional employees; however it would not create a long term demand for additional employees. Solargen's 1,000 MW Panoche Valley Solar Farm estimates a need of 10 workers during plant operation (Solargen 2009). In comparison, the proposed RSPP 250 MW parabolic trough project would employ 84 full-time employees during operation.

A solar PV at the Ridgecrest site is not expected to have adverse impacts on minority or low income populations. Benefits from a solar PV project at the RSPP site are likely to less than the benefits from the RSPP project in the Ridgecrest City region. These include increases in sales taxes, employment, and income for Kern County. Like the RSPP project solar PV facilities would not be required to pay property taxes on their facility over the life of the project, thus not contributing to the county's revenue.

Comparison to Proposed Project

Similar to a parabolic trough facility at the proposed site, a solar PV facility would not result in adverse socioeconomic impacts. However, benefits to the Ridgecrest area would be reduced during operations due to a significantly reduced workforce.

Soil and Water Resources

The construction activities associated with solar PV development at the RSPP site have the potential to adversely impact surface water quality. During grading and construction activities there is the potential for surface water runoff to carry pollutants and sediment offsite and degrade water quality in nearby waters. Common pollutants that could be introduced into storm water during construction include, but are not limited to, fertilizers from landscape management, petroleum hydrocarbons and heavy metals from construction vehicles. Accelerated wind and water-induced erosion may result from construction. Precipitation, or high intensity and short duration runoff events coupled with ground disturbing activities, can result in onsite erosion eventually increasing the sediment load into nearby waters. Soils devoid of vegetation have a high potential for erosion, particularly when disturbed.

A Stormwater Pollution Prevention Plan (SWPPP) would be required for construction of the solar PV facilities. This SWPPP would outline best management practices that would control sedimentation during construction. Since solar PV facilities do allow for vegetation to remain under the solar arrays and grading is often confined to access roads and construction of ancillary facilities, surface water would be allowed to percolate into the ground. However, since the projects would involve extensive construction and grading on the site a drainage plan would be developed to ensure minimal long-term disturbance to drainage patterns.

Because the solar PV technology does not require any water for cooling or steam generation, the technology uses less water during operations than solar concentrating technologies. For certain PV technologies, water is required only for washing the solar PV arrays. Solargen's 1,000 MW Panoche Valley Solar Farm (2009) would use 10.5 AFY during operation. First Solar's 550 MW Desert Sunlight Solar Farm (thin film) operation water estimates are for domestic purposes (drinking, washing, and toilets) and would be no more than a few hundred gallons per day. However, during construction an estimated 1,800 AFY would be required for soil compaction, dust control and sanitary needs (First Solar 2010). The RSPP project proposes to use 150 AFY for operation of the power plant.

Comparison to Proposed Project

Impacts related to erosion and sedimentation for a solar PV installation at the RSPP site would be reduced in comparison to a parabolic trough facility at the same location given the need for less ground disturbance. In addition, impacts related to water consumption at solar PV facilities would be less since this technology requires much less water during operation. As such, a solar PV facility would create lesser impacts to soils and water than the proposed RSPP facility.

Traffic and Transportation

A construction traffic control and transportation demand implementation program would need to be developed in coordination with Caltrans for the RSPP site. This analysis may result in the need to limit construction-period truck and commute traffic to off-peak periods to avoid or reduce traffic and transportation impacts. These impacts would likely be similar to those of the proposed project as a solar PV project would likely require the use SR 395 and SR 178 and other smaller roads for access.
Transportation facilities serving the solar PV facility would be the same as the proposed RSPP site. Inyokern Airport, just west of Ridgecrest, provides the nearest commercial airport service. Other airports in the region include California City Municipal Airport, Trona Airport, Mojave Air and Space Port, Edwards Air Force Base, and China Lake NAWS. Kern Regional Transit's Mojave Ridgecrest Express offers limited Monday-Wednesday-Friday bus service between Mojave, California City, Inyokern, and Ridgecrest and between Inyokern, Mojave, and Lancaster.

Comparison to Proposed Project

Impacts to traffic and transportation from a solar PV facility at the RSPP site would be generally similar to the proposed project. The construction workforce and need for heavy duty vehicle trips would be similar, and construction activities would create the greatest impacts to traffic and transportation. As noted above, more operations personnel would be needed at a parabolic trough facility but impacts from the limited number of commuters and deliveries would not be expected to create greater impacts to traffic and transportation than a solar PV facility at the site especially since water would be trucked to the PV facility during operations while the parabolic trough facility would obtain water from a pipeline. However, the solar PV facility would not create glare impacts that could potentially affect travelers along adjacent roadways.

Transmission Line Safety and Nuisance

Similar to the proposed project, this alternative would not be likely to cause transmission line safety hazards or nuisances. As stated in the **TRANSMISSION LINE SAFETY AND NUISANCE** section, the potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current standard industry practices, and the potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards, while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route. As with the proposed RSPP transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information.

Visual Resources

Environmental Impacts

The size and height of the solar PV arrays would likely be visible from nearby areas, including recreation areas and the El Paso Mountains. The large number of solar PV arrays, access roads, and interconnection power lines required for a 250 MW solar facility would introduce prominent industrial features. However, the solar PV technology would not introduce components as tall as the 22-foot parabolic trough structures since solar PV modules range from 5-15 feet in height. Additional components at the solar parabolic trough would range up to 120 feet in height (air cooled condenser). Similar to the RSPP project, a solar PV project would likely require a high voltage line, approximately 140 feet in height. Since most PV panels are dark in color to absorb sun light, rather than mirrored to reflect it, glare and reflection would be lessened.

Comparison to Proposed Project

Converting open space to industrial use would be required for both a solar PV project and the RSPP project, thus altering the aesthetics of the land and impacting viewers. However, visual impacts from a solar PV facility would be less, since solar PV modules are shorter in height than parabolic trough structures, and the RSPP project would employ a 120 foot tall air cooling condenser. Impacts to the viewshed from a high voltage transmission line would be the same from both technologies. Impacts from glare would be greater from the RSPP project. Overall a solar PV facility would have fewer impacts on visual resources than the RSPP project.

Waste Management

Environmental Impacts

Like the RSPP project, solid waste disposal must comply with federal, state and local statutes and regulations. Construction activities would involve the limited transport,

storage and disposal of hazardous waste. Hazardous waste during construction and operation would include diesel, oil and gasoline, and transformer oil (SLO 2009). Operation activities for the Panoche Valley Solar Farm would not require the use of hazardous waste (Solargen 2009).

Comparison to Proposed Project

Waste disposal impacts during construction are expected to be similar for both technologies. Waste disposal impacts from operations would be less for a solar PV project than the RSPP project since no HTF-contaminated soils or reverse osmosis cleaning wastes would generated at a PV facility. The total amount of nonhazardous waste generated from operation of the RSPP project is estimated to be approximately 20 cubic yards per week. In addition, 0.5 cubic yards per week of hazardous waste would be generated during operation. While the exact amount of construction waste produced for a solar PV project is unknown, it is likely to be less than the RSPP project. The environmental impacts of waste disposal from a solar PV facility site would be fewer than those for the proposed RSPP project.

Worker Safety and Fire Protection

Environmental Impacts

Industrial environments are potentially dangerous, during both construction and operation of facilities. Workers at the proposed project would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress problems. The workers may experience falls, trips, burns, lacerations, and numerous other injuries. They have the potential to be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks and electrocution. During construction and operation of the solar PV facility there is the potential for both small fires and major structural fires. However, no heat transfer fluid (HTF) would be required. Electrical sparks, combustion of fuel oil, flammable gas or liquids, explosions, and over-heated equipment, may cause small fires. Compliance with all LORS will be adequate to assure protection from all fire hazards.

Comparison to Proposed Project.

The environmental impact of worker safety and fire protection of a solar PV facility at the project site would be less than the RSPP project.due to the lack of HTF.

Facility Design

This analysis encompasses the civil, structural, mechanical and electrical engineering design of a project. It is assumed that each renewable technology would abide by the required LORS for that facility and would comply with the California Building Standards Code.

Geology, Paleontology and Minerals

Environmental Impacts

Grading and ground disturbing activities required for a solar PV facility vary and however minimal, could cause impacts to geology resources. The applicant would follow

all applicable building codes and standard practices for power plant construction as required by the CEC including: Title 24, California Code of Regulations, which adopts the current edition of the CBC as minimum legal building standards; the 2001 California Building Code (CBC) for design of structures; the 1996 Structural Engineers Association of California's Recommended Lateral Force Requirements, for seismic design; ASME-American Society of Mechanical Engineers Boiler and Pressure Vessel Code, and the NEMA-National Electrical Manufacturers Association.

Construction of a solar PV project would include grading, foundation excavation and utility trenching and the potential to expose paleontological resources would increase with the depth of excavations. As with RSPP site, the proposed conditions of certification are designed to mitigate any paleontological resource impacts to a less-than-significant level. Potential mineral and paleontological resources could be avoided through the flexible siting of the project infrastructure.

Comparison to Proposed Project

Depending on the solar PV technology used, a solar PV facility at the RSPP sites would likely create fewer impacts to geologic resources because solar PV tends to have less grading and ground disturbing requirements.

Power Plant Efficiency

Both a solar PV facility and the RSPP project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. They would not create significant adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply, and would not consume fossil fuel energy in a wasteful of inefficient manner.

Power Plant Reliability

A solar PV facility would be generally similar to a solar parabolic trough facility in terms of plant maintainability, fuel and water availability, and reliability of the plant in relation to natural hazards. Transient cloud cover however can lead to sudden variability of the output of a PV facility (Renewable Energy World 2008). Solar thermal facilities have thermal inertia in the heat transfer fluid and the HTF rate can be slowed, which increases the temperature of the HTF. This would aid in reliability if adverse weather persists. Cloud cover over PV systems would cause temporary outages. A parabolic trough facility at the proposed site would have fewer impacts on plant reliability.

Transmission System Engineering

Locating a solar PV facility at the Ridgecrest City site would not require a longer interconnection than at the proposed RSPP site. As such, the transmission system evaluation for a solar PV facility at the RSPP site would be similar to that of the RSPP project.

Summary of Impacts – Solar PV Technology – Utility Scale at the RSPP Site

The impacts from a solar PV technology can vary and strongly depend on the type of PV technology used. The amount of grading required is a primary difference in the

technologies and affects the project impacts to biological resources, cultural resources, air quality and public health and safety. A utility scale solar PV facility would create a number of substantial adverse effects similar to those created by the proposed RSPP facility. If utility scale solar PV technology were built at the RSPP site, approximately 750 to 2,500 acres would be disturbed, depending on the technology. Because the proposed site is crossed by several desert washes, it is likely that additional acreage would be required to site the solar PV arrays away from the major washes. It is likely that a portion of the entire site would be graded, removing all vegetation and animal life from the area.

A Solar PV facility would have impacts similar to the proposed RSPP project in 9 of the 20 areas for environmental and engineering resource elements: recreation and wilderness, land use, worker safety and fire protection, transmission line safety, public health and safety, traffic and transportation, facility design, power plant efficiency and transmission system engineering.

A Solar PV facility would likely have greater impacts than the proposed RSPP site for the following resource element: power plant reliability and socioeconomics and environmental justice (reduced benefits during operations).

A solar PV facility would have fewer impacts than the proposed RSPP project for five resources: soil and water resources, visual resources, noise and vibration, hazardous materials, and waste management. If significant grading is not required, then the following additional resource areas would have fewer impacts: air quality, biological resources, cultural resources, and geology, paleontology and minerals. However, if the PV technology employed requires grading of the entire site, than impacts to the aforementioned resources areas would be similar to the RSPP project.

B.2.8 ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN FURTHER DETAIL

This section considers potential alternatives to the proposed RSPP project that were evaluated, and determined to not be feasible for meeting key project objectives, they are not yet commercially available, or they would not result in lesser impacts than the proposed action. This analysis complies with state and federal environmental laws by providing an analysis of reasonable alternatives which could substantially reduce or avoid any potentially significant adverse impacts of the proposed project. However, because these alternatives would not avoid or substantially reduce the adverse impacts of the proposed RSPP or because they do not meet project objectives and/or the purpose and need for the project, they are not analyzed in further detail in this SA/DPA/DEIS.

B.2.8.1 Applicant's Site Alternatives

The following alternative sites were evaluated in this analysis and, based on the findings of those analyses, were not carried forward for detailed evaluation in this SA/DPA/DEIS:

- Alabama Hills Alternative Site
- Boron Alternative Site
- South of California City Alternative Site

Each site is discussed in the following paragraphs.

Alabama Hills Alternative Site

Alabama Hills was identified by Solar Millennium LLC in the AFC as a potential alternative site for the proposed RSPP project. The Alabama Hills Alternative Site is 2,600 acres and occupies Sections 20, 21, 28 and 29 of Township 16S, Range 36E. The site is on BLM land south of Lone Pine in Inyo County; no ROW applications have been received by BLM for any portion of the Alabama Hills site (SM 2010a). The site is located in the Alabama Hills National Recreation area and has a 5% grade (SM 2009a, page 4-7). A 7.5 mile transmission line would be required to interconnect to a 230-kV Los Angeles Department of Water and Power (LADWP) transmission line. Highway 395 is 0.7 miles east of the site and new roads accessing the site would be required. The solar resource at the site is 7.2 kWh/m2/day in comparison to the RSPP site solar resource of 8 kWh/m2/day. A stream traverses the southwest corner of the site. There are no wetlands or riparian areas on the site but ephemeral washes on the site likely qualify as jurisdictional waters of the state (SM 2010a).

The Alabama Hills Alternative site is located northwest of the proposed RSPP site; see **Alternatives Figure 6**.

The Alabama Hills Alternative site was not pursued as a possible site for the proposed RSPP project because the ground slope exceeded the 2% threshold; and its solar resource is lower than at the RSPP site. The site (and access roads) would also be within the Alabama Hills National Recreation Area. This area has historically been used for filming old westerns & cowboy movies and more recently television commercials and videos.

Environmental Assessment

As with the proposed RSPP site, the Alabama Hills site would result in the permanent loss of approximately 2,600 acres of desert habitat. Although CNDBB records do not indicate the presence of sensitive species on the site, several special-status species have been documented within five miles of the site (SM 2010a). The site contains channels descending from foothills of the Eastern Sierras towards Owens Lake. The ephemeral washes may facilitate animal movement in the area. The washes, although impacted by a 250 MW solar facility at this location, would not be required for the continued functioning of biological and ecological processes in the immediate area due to the similarity of vegetation type and density at the site and surrounding area (SM 2010a). The results of a cultural resources record search indicate that no resources have been previously recorded within the Alabama Hills Alternative site.

Impacts to land use and recreation at Site AS1 would potentially be significant as it is within the Alabama Hills National Recreation Area and would be visible from nearby vistas. The site is not located within the CDCA and WEMO Planning Areas as is the RSP site. Both the proposed RSPP site and the Alabama Hills Alternative site would require a large lease area from BLM and both sites would require extensive grading, potentially resulting in erosion and runoff. The Alabama Hills Alternative site would likely be visible to viewers in the Alabama Hills National Recreation Area. Given the size of

the power plants and their locations on BLM land used for recreational purposes, visual impacts would be considerable and similar at both locations.

Rationale for Elimination

The Alabama Hills Alternative site would likely cause biological and cultural resources impacts due to the extensive grading required for the 250 MW solar power plant (approximately 2,000 acres). Additionally, because the Alabama Hills site is further from a existing road than the proposed RSPP site, longer access roads would be required increasing the amount of grading and potentially resulting in greater soil impacts and wind and water erosion. Given the Alabama Hills Alternative site location within the Alabama Hills National Recreation Area, visual impacts would potentially be significant. This alternative site would not reduce the potential impacts of the proposed RSPP project without creating severe impacts of its own. Therefore, the Alabama Hills Alternative site was eliminated from further consideration in this SA/DPA/DEIS.

Boron Alternative Site

The Boron Alternative site was identified by Solar Millenniun, LLC in the AFC as a potential alternative site for the proposed RSPP project. The Boron Alternative Site is 1,900 acres and occupies Sections 13 and 24 of Township 1N, Range 9W and Section 19 of Township 1N, Range 8W. All but 50 acres of the site are owned by US Borax Inc. (SM 2010a). The site is approximately 0.5 miles west of North Edwards. Highway 58 is approximately two miles to the south. Edwards Air Force Base is directly south of the site. Paved and unpaved roads cross the site and the site is listed on environmental databases as being used for pesticide production. Corrective Action may be required at the site. It is also listed as a formerly used military site – Pac Coast Borax Plant and Landing Field Boron, although the military has indicated that it had no operations at the landing field. Borrow pits, a mine dump and tailing ponds occur at the site (DOD 1999). A 16.2 mile transmission line would be required to interconnect to a 230-kV SCE transmission line. The solar resource at the site is 7.7 kWh/m2/day. A stream traverses the southwest corner of the site. There are no wetlands or riparian areas on the site but ephemeral washes on the site likely qualify as jurisdictional waters of the state (SM 2010a). The results of a record search indicate that no resources have been previously recorded within the Boron Alternative site.

The site is located southwest of the proposed RSPP site; see **Alternatives Figure 7**. It was not pursued as a possible site for the proposed project by the applicant because of the poor probability of obtaining site control from the owners of the multiple parcels of private land comprising the site, insufficient size and greater distance for transmission interconnection (SM 2009a).

Environmental Assessment

The project would require grading of approximately 2,000 acres of what appears to be land degraded in a number of areas. The site is not located within designated Desert Tortoise Critical Habitat. CNDDB records indicate the presence of desert tortoise, Mohave ground squirrel and several sensitive plant species within a five mile radius of the site (SM 2010a). As private land, the Boron site does not support recreational uses. A solar facility at the Boron Alternative site would be visible to travelers along Highway 58 and would be in contrast to the surrounding area. The site is zoned limited

agriculture (A-1); a Conditional Use Permit from Kern County would be required for a solar facility at this site. No Williamson Act lands occur on the site. Historic mining operations on the site may have resulted in contamination within the site.

Rationale for Elimination

The feasibility of the Boron Alternative site is questionable in that US Borax, the main property owner, is the major landowner at the site and operations at the US Borax's Boron operations are projected to last at least 75 years (U.S. Borax 2010). Contamination may occur at the site and grading of borrow pits, tailing ponds, and mines would be required. The Boron Alternative site's proximity to Edwards Air Force Base may be within "no build" or "no fly" areas and glare from plant operations could impact base operations. For these reasons, the Boron Alternative site was eliminated from further consideration in this SA/DPA/DEIS.

South of California City Alternative Site

The South of California City (SCC) Alternative site was identified by Solar Millenniun, LLC in the AFC as a potential alternative site for the proposed RSPP project. The SCC Alternative Site is 1,300 acres and occupies Sections 29 and 30 of Township 11N, Range 9W. Three separate lands owners comprise the site; US Borax is the largest land owner with 634.5 acres (SM 2010a). The site is approximately 8.5 miles southwest of California City and approximately 10 miles west of Boron. Highway 58 is approximately 2,000 feet to the south. Edwards Air Force Base is directly south of the site. A residential area is 0.5 miles to the east. Unpaved roads cross the site. A 20 mile transmission line would be required to interconnect to a 230-kV SCE transmission line although connections to LADWP lines would be shorter (12.3 miles and 15.9 miles). The solar resource at the site is 7.7 kWh/m2/day. The site is zoned for both limited agriculture (A-1) and light manufacturing (M-1). There are no wetlands or riparian areas on the site but ephemeral washes on the site likely qualify as jurisdictional waters of the state (SM 2010a). The eastern portion of Section 29 is ADIRM flood zone.

The SCC Alternative site is located southwest of the proposed RSPP site; see **Alternatives Figure 8**.

It was not pursued as a possible site for the proposed project by the applicant because of the poor probability of obtaining site control from the owners of the private land comprising the site, insufficient size and greater distance for transmission interconnection (SM 2009a).

Environmental Assessment

The project would require grading of approximately 1,300 acres of land. The site is not located within designated Desert Tortoise Critical Habitat. The results of a record search indicate that no resources have been previously recorded within the SCC site. A CNDDB search indicated the potential presence of Prairie falcon (*Falco mexicanus*), burrowing owl (*Athene cunicularia*), Mohave ground squirrel (*Xerospermophilus mohavensis*), desert tortoise (*Gopherus agassizii*), and desert cymopterus (*Cymopterus deserticola*). As private land, the SSC site does not support recreational uses. A solar

facility at the SSC Alternative site would be visible to travelers along Highway 58 and would be in contrast to the surrounding area, particularly to the residential community 0.5 miles to the east.

Rationale for Elimination

The SSC site is considerably smaller at 1,300 acres than the 2,002 acre footprint of the RSPP site. A smaller solar facility (approximately 150 MW based on roughly similar acreage at the Northern Unit Alternative) would not meet the applicant's objective of providing 250 MW of solar energy. The SSC Alternative site's proximity to Edwards Air Force Base may be within "no build" or "no fly" areas and glare from plant operations could impact base operations. For these reasons, the SCC Alternative site was eliminated from further consideration in this SA/DPA/DEIS.

Ridgecrest Landfill Alternative Site

Several public comments suggested that the RSPP project be sited on a triangular segment of BLM land encompassing the Ridgecrest Landfill. Although approximately 3,000 acres of land would be available, optimum design features for a solar field would require rectangular arrangement of array, preferably close to square, with the power block located in the center of the solar field. The presence of the landfill would not allow for optimum placement of the arrays and power output would be lower than at the RSPP site. There is significant debris (cars, waste) on the site and multiple washes occur throughout the site. The terrain is very uneven and rolling and major grading of the site would be required. Residences occur within 0.5 miles of the site and residential development is 1.0 mile from the site boundary. A shorter water line (approximately 2miles) and longer transmission interconnection (approximately 3.3 miles) would be required. The northern boundary of the site is located two miles south of the China Lake Naval Weapons Center. Improvements to Highway 395 may require use of this land in the future. See **Alternatives Figure 10** at the end of this section for a depiction of the Ridgecrest Landfill Alternative.

Environmental Assessment

Locating a solar facility at the Ridgecrest Landfill Alternative site would result in substantial altering of the existing land given the extensive need for grading of the uneven terrain. Although the site has experienced dumping, desert tortoise, Mohave ground squirrel and special status species are likely present and grading would result in the loss of habitat and species. The multiple, large washes on the site would require extensive engineering controls and thus would alter natural drainage patterns. Construction impacts to sensitive receptors would be greater. The extensive need for grading and the closer proximity to residents would increase the level of dust and the risk of Valley fever. Impacts to water supply would be similar to that of the RSPP, depending on the ultimate size of the solar facility. Impacts to recreation would be reduced. Visual impacts to residents would be greater. Cultural impacts would be reduced at the Ridgecrest Landfill Alternative site. Land use impacts would potentially be greater should the City of Ridgecrest desire to expand its western boundary in the future.

Rationale for Elimination

The Ridgecrest Landfill Alternative site would not permit the optimum placement of solar arrays to generate 250 MW. The presence of the landfill and traffic associated with landfill operations would impact the ability to place arrays on the northwestern section of the site. The closer proximity to residents would cause greater impacts, particularly during construction. Drainage impacts would be greater at this location. The loss of biological habitat and a need for groundwater from the Indian Wells Valley Water District would be similar to the proposed RSPP project. The Ridgecrest Landfill Alternative site's proximity to China Lake Naval Weapons Center could cause glare impacts to military operations. For these reasons, the Ridgecrest Landfill Alternative site was eliminated from further consideration in this SA/DPA/DEIS

B.2.8.2 Alternative Solar Generation Technologies

In addition to the range of alternative sites discussed earlier, several alternative solar generation technologies were evaluated as potential alternatives to the proposed RSPP project (which would use the parabolic trough technology). Although alternative solar generation technologies would achieve most of the project objectives, each would have different environmental or feasibility concerns. The following solar generation technologies were considered in this analysis:

- Stirling dish technology
- Solar power tower technology
- Linear Fresnel technology
- Distributed solar technologies

Among the solar thermal technology alternatives, the linear Fresnel alternative has the potential for least ground disturbance due to its more compact configuration (reducing ground disturbance); however, the technology is proprietary and is not available to other applicants or developers. The distributed solar alternative would have fewer impacts than the proposed RSPP project because it would be located on already existing buildings or on already disturbed land. However, achieving 250 MW of distributed solar PV or solar thermal would depend on additional policy support, manufacturing capacity, and lower cost than currently exists to provide the renewable energy required to meet the California Renewable Portfolio Standard requirements so additional technologies, like utility-scale solar thermal generation, would also be necessary.

These analyses assumed that the alternative technologies would be implemented on the site for the proposed RSPP project site.

Stirling Dish Technology

Stirling dish technology uses a mirror array to convert thermal energy to electricity by concentrating and focusing sunlight on the receiver end of a Stirling engine. The curved dishes used to focus the sun's energy stand approximately 45 feet tall and occupy a maximum horizontal space of approximately 1,135 square feet (0.026 acres), with an anchored footprint of 12.5 square feet (assumed 4-foot diameter caisson). See **Alternatives Figure11** for an illustration. The internal side of the receiver heats

hydrogen gas, which expands; the pressure created by the expanding gas drives a piston, crankshaft, and drive shaft. The drive shaft turns a small electricity generator.

The entire energy conversion process takes place within a canister the size of an oil barrel. The generation process requires no water, and the engine does not produce emissions as no combustion takes place. Each concentrator consists of one Stirling engine mounted above one mirror array. Very little maintenance is required once each concentrator is installed, aside from periodic washing of the surface of the mirrors. In general, the Stirling system requires 7 to 9 acres of land per MW of power generated; a 250-MW Stirling engine field would require from 1,750 acres to 2,250 acres of land. Site preparation involves sinking a cement base with an embedded pedestal to support the dish (SES 2008). Each Stirling dish generates 25 kilowatts (KW) of power, so 10,000 dishes would be required to generate 250 MW. Each dish includes two major elements:

- **Solar Concentrator.** Large parabolic concentrators include 89 mirror facets attached to a frame by three point adjusting mounts (SES 2008). They are designed in five subassembly units for ease of transport and installation on site. Two small motors are attached to the pedestal and programmed to swivel the dish on two axes, following the sun's progress across the sky during the day.
- **Power Conversion Unit.** The Stirling engine's cylinder block incorporates four sealed cylinder assemblies along with coolers, regenerators, and heater heads (SES 2008). Concentrated solar energy heats up self-contained gas (hydrogen) in the power conversion unit, causing the gas to expand into the cylinders, moving the cylinders, and generating electricity. This cycle is repeated over and over as the engine runs at a steady rate of 1,800 rpm (SES 2008). Power is generated by heat transfer from the concentrated solar rays to the working gas in the engine's heater head, which converts the heat energy into mechanical motion. The generator of each unit in a utility-scale project is connected by underground transmission line to a small substation where the power can be transformed into a higher voltage for more efficient transmission across the grid.

Environmental Assessment

The land area required for a 250-MW Stirling engine power plant is similar to that required for the proposed RSPP project. However, it is not necessary to grade the entire parcel as only the 18-inch diameter pedestal of the Stirling engine requires level ground. It would still be necessary to grade permanent access roads between every two rows of Stirling engines due to the need for periodic mirror washing, which would result in vegetation removal. Additionally, because the proposed RSPP site is crossed by several desert washes, the installation of 10,000 Stirling engines could require a larger total acreage of land, resulting in a greater loss of habitat.

Due to the size and height of the Stirling mirrors, impacts to visual resources would be similar or greater to those of RSPP; 10,000 Stirling engines 45 feet in height would introduce an industrial character and transformation of the site. There would be less grading for the Stirling engine structures, but the numerous access roads required for cleaning the energy systems would impact biological and cultural resources and create a high contrast between the disturbed area and its surroundings.

Summary of Impacts

The large area needed for a Stirling engine power plant would be comparable to the land requirement for the RSPP power plant. Although grading requirements for the Stirling engines and solar concentrators are relatively small, grading for access roads would be extensive because access roads are required for every other row of Stirling engines (SES 2008a). For these reasons, recreation and land use, and biological and cultural resources impacts would be similar to those of the RSPP facility. In addition, due to the extent of the facility and the height of each concentrator, visual impacts would not be significantly reduced by this alternative and may be greater considering that the 45-foot high solar concentrators would be more pronounced than the approximately 22-foot high parabolic troughs. However, the Stirling technology does not require a cooling system or a turbine reducing the need for structures up to 120 feet in height.

Rationale for Elimination

Because no substantial reduction in impact has been identified, the Stirling dish technology has been eliminated from further consideration as an alternative technology.

Solar Power Tower Technology

The solar power tower technology converts thermal energy to electricity by using heliostat (mirror) fields to focus energy on a boiler located on power tower receivers near the center of each heliostat array. Each mirror tracks the sun during the day. The heliostats would be 7.2 feet high by 10.5 feet wide. See **Alternatives Figure 11** for an illustration. The solar power towers can be up to 459 feet tall with additional 10-foot tall lightening rods. The solar power tower would receive heat from the heliostats then convert the heat into steam by heating water in the solar boilers. A secondary phase would convert the steam into electricity using a Rankine-cycle reheat steam turbine electric generator housed in a power block facility at each of the plants.

In general, a solar power tower power plant requires 5 to 10 acres of land per MW of power generated. A 250 MW solar power tower field would require from 1,250 acres to 2,500 acres of land.

Site preparation involves grading the heliostat field and grading the access roads required for maintenance. Each heliostat field has the following primary components.

- Heliostats. The heliostat mirrors are arranged around each solar receiver boiler. Each mirror tracks the sun throughout the day and reflects the solar energy to the receiver boiler. The heliostats are approximately 7.2 feet high by 10.5 feet wide. They are arranged in arcs around the solar boiler towers asymmetrically.
- Power Tower. The power tower structure height is up to 459 feet. Primary thermal input is via solar receiver boilers, superheater and reheaters at the top of the distributed power towers.
- Steam Turbine Generator (STGs). The steam turbine system consists of a condensing steam turbine generator with reheat, gland steam system, lubricating oil system, hydraulic control system, and steam admission/induction valving. Power

would be generated by the STGs at 19 kV (hydrogen cooled) and then stepped up by transformers for more efficient transmission across the grid.

Environmental Assessment

The land area required for a 250 MW solar power tower plant is similar to that required for the proposed RSPP project. Grading of almost the entire RSPP site would be required along with grading of permanent access roads due to the need for regular washing of the mirrors. This grading would cause removal of vegetation and loss of wildlife. Additionally, because the proposed RSPP site is crossed by desert washes, the installation of the heliostats and power towers could require a larger total acreage of land, resulting in a greater loss of habitat.

Due to the size and height of the solar power towers, up to 600 feet, and mirrors, impacts to visual resources would be greater than those of the RSPP project and would introduce an industrial character to this site and the surrounding areas.

Because of the height of the solar power towers, there may be concerns regarding nearby aviation or military operations. The solar power tower technology built at the RSPP site would be located in the military Special Use Airspace Complex which establishes height limitations on structures within the Complex area, thus conflicts with the nearby China Lake Naval Air Weapons Station may arise.

Rationale for Elimination

The area needed for a solar power tower plant would be comparable to the land requirement for the RSPP. Grading requirements for the solar power tower would be extensive because of the minimal slope requirements for the heliostat fields. For these reasons, recreation and land use, biological resources, cultural resource and soil erosion impacts would be similar to those of the RSPP facility. In addition, due to the extent of the facility and the height of the power towers, visual impacts would like be greater for this alternative. Additionally, the height of the power tower would create potential impacts with the adjacent military facilities.

Because no substantial reduction in impacts would occur under this alternative technology, the solar power tower technology was eliminated from further consideration in this SA/DPA/DEIS as an alternative technology.

Linear Fresnel Technology

A solar linear Fresnel power plant converts solar radiation to electricity by using flat moving mirrors to follow the path of the sun and reflect its heat on the fixed pipe receivers located about the mirrors. During daylight hours, the solar concentrators focus heat on the receivers to produce steam, which is collected in a piping system and delivered to steam drums located in a solar field and then transferred to steam drums in a power block (Carrizo 2007). The steam drums transferred to the power block will be used to turn steam turbine generators and produce electricity. The steam is then cooled, condensed into water, and recirculated back into the process.

In general, the linear Fresnel technology requires 4 to 5 acres of land per MW of power generated. A 250 MW solar linear Fresnel field would require approximately 1,000 to 1,250 acres of land.

Each row-segment is supported by large hoops that rotate independently on metal castors. Rotation of the reflectors would be driven by a small electrical pulse motor. Reflectors are stowed with the mirror aimed down at the ground during the night. The major components are:

- Compact Linear Fresnel Reflector (CLFR) Solar Concentrator. A solar Fresnel power plant would use Ausra's CLFR technology which consists of slightly curved linear solar reflectors that concentrate solar energy on an elevated receiver structure. Reflectors measure 52.5 by 7.5 feet (Carrizo 2007). There are 24 reflectors in each row. A line is made up of 10 adjacent rows and operates as a unit, focusing on a single receiver (Carrizo 2007).
- Receiver Structure. The receiver structure is approximately 56 feet tall (Carrizo 2007). It would carry a row of specially coated steel pipes in an insulated cavity. The receiver would produce saturated steam at approximately 518°F from cool water pumped through the receiver pipes and heated (Carrizo 2007). The steam would drive turbines and produce electricity.

Rationale for Elimination

The Fresnel solar technology is a proprietary technology owned by Ausra, Inc. However, Ausra, Inc. has changed its focus to being a technology and equipment provider rather than an independent power developer and owner and will focus on medium-sized (50 MW) solar steam generating systems for customers including steam users, such as food processors and enhanced oil firms and utilities for power augmentation systems that deliver steam into existing fossil-fuel power plants. A project of 250 MW is theoretically possible, and would require smaller acreage per megawatt. However, at 1,250 acres for 250 MW, this technology would not eliminate the significant impacts of the proposed RSPP technology at this site.

Distributed Solar Technology

There is no single accepted definition of distributed solar technology. The *2009 Integrated Energy Policy Report* (IEPR) defines distributed generation resources as "grid-connected or stand-alone electrical generation or storage systems, connected to the distribution level of the transmission and distribution grid, and located at or very near the location where the energy is used."

Distributed solar facilities vary in size from kilowatts to tens of megawatts but do not require transmission to get to the areas in which the generation is used. Distributed solar generation is generally considered to use photovoltaic (PV) technology although at slightly larger scales it is also being implemented using solar thermal technologies. Both technologies are considered below.

Distributed Solar PV Systems

A distributed solar alternative would consist of PV panels that would absorb solar radiation and convert it directly to electricity. The PV panels could be installed on

residential, commercial, or industrial building rooftops or in other disturbed areas such as parking lots or disturbed areas adjacent to existing substations. To be a viable alternative to the proposed RSPP project, there would have to be sufficient newly-installed panels to generate 250 MW of capacity.

California currently has over 500 MW of distributed solar PV systems which cover over 40 million square feet (CPUC 2009). During 2008, 158 MW of distributed solar PV was installed in California, doubling the amount installed in 2007 (78 MW), and with 78 MW installed through May 2009, installation data suggests that at least the same amount of MW could be installed in 2009 as in 2008 (CPUC 2009).

Rooftop PV systems and parking lot systems exist in small areas throughout California. Larger distributed solar PV installations are becoming more common. Examples of distributed PV systems are:

- Nellis Air Force Base (AFB, Nevada): Over 72,000 solar panels, generating 14 MW of energy, were constructed in 2007, by SunPower Corp. on 140 acres of Nellis AFB land (Whitney 2007). Energy generated is used at the Nellis AFB.
- Southern California Edison (Fontana, CA): SCE has installed over 3 MW of distributed solar energy in two phases on over 1 million square-foot commercial roof using thin film PV technology provided by First Solar. This is the beginning of a planned installation of 3.5 million PV panels that would generate 250 MW of capacity (SCE 2009).
- San Diego Gas & Electric (San Diego, CA): SDG&E's Solar Energy Project is designed to install up to 80 MW of solar PV, which would include PV installation on parking structures and tracking systems on open land (SDG&E 2008).
- Pacific Gas & Electric (San Francisco, CA): PG&E launched a five-year program to develop 500 MW of solar PV power. The program would consist of 250 MW of utility-owned PV generation and an additional 250 MW to be built and operated by independent developers under a streamlined regulatory process. PG&E's program targets mid-sized projects, between 1 to 20 MWs, mounted on the ground or rooftops within its service area (PG&E 2009).
- City of San Jose (San Jose, CA): The City of San Jose is considering the development and implementation of 50 MW of renewable solar energy on city facilities and/or land (San Jose 2009). San Jose's Green Vision lays out a goal of achieving 100% of the city's electricity from renewable energy by 2020 and plans to implement strategies of a 24-month period to increase solar installations in San Jose by 15%. The City anticipates that City facilities with appropriate solar access including parking lots, garages, lands and landfills would be eligible for solar installation and San Jose received ARRA funding for the project.

Like utility-scale PV systems, the acreage of rooftops or other infrastructure required per MW of electricity produced is wide ranging. As stated above, California has approximately 40 million square feet (approximately 920 acres) of distributed solar PV accounting for 441 MW installed (CPUC 2008a). However, based on SCE's use of 600,000-square-feet for 2 MW of energy, 75 million square feet (approximately 1,721 acres) would be required for 250 MW.

A study prepared in 2007 by Navigant Consulting, Inc. (NCI) and the Energy Commission calculated the economic potential of rooftop PV, by county, for new and retrofitted buildings (NCI 2007). Kern County was identified as having 37 MW of economic potential PV in 2016 which would be dependent upon subsidies and favorable business models. However, distributed solar PV could be located throughout the State. The location of the distributed solar PV would impact the capacity factor of the distributed solar PV.[1] The capacity factor depends on a number of factors including the insolation[2] of the site. Because a distributed solar PV alternative would be located throughout the State, the insolation at some of these locations may be less than in the Mojave Desert. The Renewable Energy Transmission Initiative (RETI) assumed a capacity factor of approximately 30% for solar thermal technologies and tracking solar PV and approximately 20% capacity factor for rooftop solar PV which is assumed to be non-tracking, for viable solar generation project locations (B&V 2009; CEC 2009). Tracking distributed solar PV would have a higher capacity factor as well.

Environmental Assessment

Installations of 250 MW distributed solar PV would require up to 75 million square feet (approximately 1,721 acres). Distributed solar PV is assumed to be located on already existing structures or disturbed areas so little to no new ground disturbance would be required and there would be few associated biological and cultural resources impacts. Minimal grading or new access roads would be required and relatively minimal maintenance and washing of the solar panels would be required. As such, it is unlikely that the rooftop solar PV alternative would create erosion impacts. Some water would be required to wash the solar panels, especially with larger commercial rooftop solar installations; however, the commercial facilities would likely already be equipped with drainage systems. Therefore, the wash water would not contribute to runoff or to erosion.

Because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would be lessened. Additionally, the distributed solar PV alternative would not require the additional operational components, such as dry-cooling towers, HTF system, substations, transmission interconnection, and maintenance and operation facilities with corresponding visual impacts. Solar PV panels would be visible to passing residents and may be viewed by a larger number of people.

Consideration of CEQA/NEPA Criteria

Reduction of Impacts

Distributed solar technology is assumed to be located on already existing structures or disturbed areas so little to no new ground disturbance would be required; there would be few associated impacts to biological and cultural resources. Additionally, impacts to soils and waters as well as visual resources would be reduced.

[1] The capacity factor of a power plant is a percentage that tells how much of a power plant's capacity is used over time (CEC 2008a)

[2] Insolation is the total amount of solar radiation striking a surface exposed to the sky (CEC 2008a).

Meet Most Project Objectives

A distributed solar technology alternative, if constructed at 250 MW, would meet the CEC project objectives to operate 250 MW of renewable power in California capable of selling competitively priced renewable energy. The solar technology would not necessarily meet the objective to locate the facility in areas of high solarity, because the distributed technology could be located throughout the State.

Feasibility

The rate of PV manufacturing and installation is expected to continue to grow very quickly. However, given that there are currently only about 500 MW of distributed solar PV in California, the addition of an additional 250 MW to eliminate the need for the RSPP project cannot be guaranteed. This would require an even more aggressive deployment of PV at more than double the historic rate of solar PV than the California Solar Initiative program currently employs. Challenges to an accelerated implementation of distributed solar PV are discussed below.

- **RETI Consideration of Subsidies, Tariffs, Cost, and Manufacturing.** The RETI Discussion Draft Paper California's Renewable Energy Goals – Assessing the Need for Additional Transmission Facilities published with the RETI Final Phase 2A Report (September 2009), addresses the likelihood of a scenario of sufficient distributed solar PV to remove the need for utility scale renewable development. This discussion paper identified the factors likely to influence the pace of large scale deployment of distributed solar PV: subsidies, feed-in tariffs, manufacturing and installation cost, and manufacturing scale-up.
- Cost. The 2009 IEPR states that solar PV technology has shown dramatic cost reductions since 2007, and is expected to show the most improvement of all the technologies evaluated in the 2009 IEPR model, bringing its capital cost within range of that of natural gas-fired combined cycle units. However, the CPUC 33% Renewables Portfolio Standard Implementation Analysis Preliminary Results considered a number of cases to achieve a 33% RPS standard. The results of this study state that the cost of a high distributed generation case is significantly higher than the other 33% RPS alternative cases. The study explains that this is due to the heavy reliance on solar PV resources which are more expensive than wind and central station solar.
- Tariffs. Additionally, the IEPR discusses the need to adjust feed-in tariffs to keep downward pressure on costs. Feed-in tariffs should be developed based on the size and type of renewable resources, given that the cost of generating energy from a 100-MW wind farm is less than the cost of generating to ensure a good mix of new renewable energy projects. According to the report, differentiating feed-in tariffs by type and size can ensure a good mix of new renewable energy projects and avoid paying too much for some technologies and too little for others.
- Limited Installations. Examples of large scale distributed solar projects are still limited. In the spring of 2008, SCE proposed 250 to 500 MW of rooftop solar PV to be installed in five years. As of January 2010, SCE had installed only 3 MW. As the 2009 IEPR points out, the potential for distributed resources remains largely untapped and integrating large amounts of distributed renewable generation on distribution systems throughout the State presents challenges.

- Electric Distribution System. The State's electric distribution systems are not designed to easily accommodate large quantities of randomly installed distributed generation resources at customer sites. Accomplishing this objective efficiently and cost-effectively will require the development of a new transparent distribution planning framework.

The 2009 IEPR makes a number of recommendations to support the integration of distributed generation into the California grid, expand feed-in tariffs, and support the efforts to achieve the RPS goals as a whole. It also recommends supporting new renewable facilities and the necessary transmission corridors and lines to access the facilities.

In testimony filed by the Center for Biological Diversity in the Ivanpah Solar Electric Generating System (ISEGS) proceeding [Docket No. 07-AFC-5], Bill Powers stated his disagreement with the conclusions of the ISEGS Alternatives FSA/DEIS section addressing distributed solar PV. Powers believed that the technology and manufacturing capacity would be adequate to develop 400 MW of distributed PV, and that the distribution system would be able to accommodate the additional distributed generation. He presents numerous examples of California utility programs that have committed to development of hundreds of megawatts of additional distributed solar PV. The conclusion of this section is that, while it will very likely be possible to achieve 250 MW of distributed solar energy over the coming years, the very limited numbers of existing facilities make it difficult to conclude with confidence that it will happen within the timeframe required for the RSPP project. As a result, this technology is eliminated from detailed analysis in this SA/DPA/DEIS.

B.2.8.3 Alternative Renewable Technologies

Non-solar renewable generation technologies were considered as potential alternatives to the proposed RSPP project. The following renewable generation technologies were considered in this analysis:

- Wind energy
- Geothermal energy
- Biomass energy
- Tidal energy
- Wave energy

The non-solar renewable technologies alternatives (wind, geothermal, biomass, tidal, wave) would either be infeasible for meeting key project objectives at the scale of the proposed RSPP project, or would not eliminate significant impacts caused by the project without creating significant impacts in other locations. Specifically, wind and geothermal energy that would be viable at some locations in Kern County could create significant impacts to biological, visual, cultural, and water and soils resources.

Wind Energy

Wind carries kinetic energy that can be used to spin the blades of a wind turbine rotor and an electrical generator, which then feed alternating current (AC) into the utility grid.

Most state-of-the-art wind turbines operating today convert 35-40% of the wind's kinetic energy into electricity. A single 1.5-MW turbine operating at a 40% capacity factor generates 2,100 MWh annually.

Wind turbines currently being manufactured have power ratings ranging from 250 watts to 5 MW, and units larger than 7 MW in capacity are now under development (AWEA 2008). The average capacity of wind turbines installed in the United States in 2007 was 1.65 MW (EERE 2008). The perception of wind as an emerging energy source reached a peak in the early 1980s, when wind turbine generators to convert wind power into electricity were being installed in California at a rate of nearly 2,000 per year. Progress slowed a few years later, however, as start-up tax subsidies disappeared and experience demonstrated some deficiencies in design. At the present time, technological progress has caught up, contributing lower cost, greater reliability, and reason for genuine optimism for this renewable energy source in the future.

This technology is now well developed and can be used to generate substantial amounts of power. There are now approximately 2,490 MW of wind-generated power being produced in California (AWEA 2008). Worldwide wind capacity reached 159,213 MW in 2009, with over 38,000 MW added in 2009 (WWEA, 2010). Modern wind turbines represent viable renewable alternatives to solar energy projects in the region as exemplified by the number of wind projects applications pending at the BLM in California. The BLM has received approximately 64 applications for wind projects in the California Desert District as of August 2009, for use of over 457,769 acres of land (BLM 2009). A total of 14 applicants have been submitted for Kern County, estimating over 4,345 MW of generation (CEC 2010).

Environmental Assessment

Wind turbines can create adverse environmental impacts, as summarized below (AWEA 2008):

- Wind energy requires between 5 and 17 acres per MW of energy created. As such a nominal 250 MW power plant would require between 1,250 and 4,250 acres. However, wind turbine footprints typically use only 5% of the total area and other uses (e.g., grazing, farming) may occur on land occupied by wind turbines.
- Erosion can be a concern in certain habitats such as the desert or mountain ridgelines. Standard engineering practices can be used to reduce erosion potential.
- Birds collide with wind turbines. Avian deaths, particularly raptors, are a substantial concern depending on raptor use of the area.
- Wind energy can negatively impact birds and other wildlife by fragmenting habitat, both through installation and operation of wind turbines themselves and through the roads and power lines that are required to support the turbines.
- Bats collide with wind turbines. The extent of bat mortality depends on turbine placement and bat flight patterns.
- Visual impacts of wind turbines can be significant, and installation in scenic and high traffic areas can result in strong local opposition. Other impressions of wind turbines are that they are attractive and represent clean energy.

Summary of Impacts

Approximately 1,250 to 4,250 acres of land would be required for a 250 MW wind electricity power plant. While wind plants would not necessarily impact the same types of wildlife and vegetation as the proposed RSPP plant, the significant acreage necessary for a 250 MW wind plant would still cause significant habitat loss in addition to potentially significant impacts from habitat fragmentation and bird and bat mortality. Wind turbines are often over 400 feet high for 2-MW turbines. As such, any wind energy project would be highly visible and can conflict with civilian or military flight operations.

Rationale for Elimination

While wind electricity generation is a viable and important renewable technology in California, it would not reduce the large-scale ground disturbance and visual impacts associated with the RSPP project. Therefore wind generation was eliminated from further consideration in this SA/DPA/DEIS. Furthermore, it is part of a renewable energy supply mix along with solar thermal, which staff believes will be needed to meet SCE and statewide RPS requirements.

Geothermal Energy

Geothermal technologies use steam or high-temperature water obtained from naturally occurring geothermal reservoirs to drive steam turbine/generators. There are vapor dominated resources (dry, super-heated steam) and liquid-dominated resources where various techniques are used to extract energy from the high-temperature water.

Geothermal plants account for approximately 5% of California's power and range in size from under 1 MW to 200 MW. California is the largest geothermal power producer in the United States, with about 1,800 MW installed capacity; in 2007, 13,000 gigawatt hours of electricity were produced in California (CEC 2008). Geothermal plants provide highly reliable baseload power, with capacity factors from 90-98%. The RETI Phase 1A Report (2008) estimated an incremental capacity of approximately 2,400 MW for the entire State by 2018.

Geothermal plants must be built near geothermal reservoir sites because steam and hot water cannot be transported long distances without substantial thermal energy loss. Geothermal power plants are currently operating in the following California counties: Lake, Sonoma, Imperial, Inyo, Mono, and Lassen.

The Most-Likely (MLK) geothermal resource capacity for Kern County is 48 MW (CEC 2005). However, the Coso geothermal facility is located in Inyo County just outside Kern County on China Lake Naval Air Weapons Station and BLM lands. The Coso Operating Company recently received a permit from Inyo County to pump approximately 4,800 AFY from Rose Valley and export the water for use in its geothermal facility (OVC 2009). The water would be injected into the reservoir to enhance and stabilize steam production; output is expected to increase from the current level of 200 MW to 272 MW, the maximum generating capability of the steam turbines (Business Wire 2010).

The BLM is currently evaluating a potential geothermal leasing area of approximately 22,060 acres in Rose Valley, based on three applications the BLM received for geothermal leasing covering approximately 4,460 acres. The BLM identified

approximately 17,600 acres of public lands, also within the Haiwee Geothermal Leasing Area and adjacent to the three geothermal lease applications, which will be considered for competitive geothermal leasing under 43 CFR 3203.10(e). The Haiwee Geothermal Leasing Evaluation Initiative EIS is expected in 2010. This is considered to be a fast track project.

Geothermal Alternative Scenario

The Coso geothermal facility is a representative 250 MW project in the vicinity of the RSPP site; however production from the field will be maximized by 2011. Geothermal development in the Haiwee Geothernal Leasing Area is under evaluation and project-specific environmental documents have not been produced. In order to develop an alternative scenario for analysis, this analysis assumes that approximately two to five smaller projects would be required to achieve 250 MW of geothermal energy. While a site-specific environmental assessment is not possible, the following analysis describes the types of environmental impacts that geothermal facilities would create.

The amount of land required for a geothermal facility varies greatly. Examples of these facilities follow:

- The Truckhaven EIS Reasonably Foreseeable Development Scenario of 50 MW included use of 14,731 acres of land, of which the total surface disturbance including well locations, access roads, pipelines, power plant sites, and transmission lines was approximately 400 acres (BLM 2007).
- The Salton Sea Unit #6 project, now the Black Rock 1, 2, and 3 Geothermal Power Project, currently proposes to develop 3,180 acres of the Salton Sea Known Geothermal Resource Area (KGRA) to generate 150 MW of energy (CEC 2009a). Of the 3,180 acres, approximately 197 acres would be graded and occupied by structures (CEC 2003).
- The Obsidian Butte region of the KGRA has nine plants producing 350 MW of geothermal energy on 4,808 acres of land. The amount of ground disturbance for these projects is unknown.

Based on the above examples, 250 MW of geothermal energy could require the use of thousands of acres of land. However, the amount of ground disturbance on that area would be less than 10%. Based on the Salton Sea Unit #6 scenario, less than 900 acres of ground disturbance would be required for 750 MW of geothermal energy. The Truckhaven EIS Reasonably Foreseeable Development Scenario would require development covering nearly 6,000 acres to achieve 750 MW of energy. Additionally, while the power plant, cooling towers and brine ponds would likely be fenced, there would not likely be fencing required for the wells and well pads. In that two to five geothermal facilities would be required for provision of 250 MW, depending on the locations of the new facilities, more transmission lines and switchyards with corresponding potential impacts (i.e., biological, cultural, soil & water, land use, visual) may be required for grid interconnection, when compared to the proposed RSPP project.

Environmental Assessment

Air Quality

As with the RSPP project, construction of geothermal facilities would cause dust and exhaust emissions with crews operating off-road equipment and on-road mobile sources. The construction phase activity would also cause emissions during well drilling from diesel engine exhaust, dust from activity on unpaved surfaces, and geothermal steam from well testing. Beyond the boundaries of the project area, exhaust emissions would also be caused by workers commuting to and from the construction sites, trucks hauling equipment and supplies to the sites, dump trucks hauling away dirt or vegetation debris, and trucks delivering fresh concrete.

Toxic air contaminants and odors would be emitted as a result of fuel combustion in construction-related equipment and vehicles and as a result of geothermal steam released during well testing. Hydrogen sulfide (H_2S) in geothermal steam is a toxic air contaminant and a colorless, flammable, poisonous compound with a characteristic rotten-egg odor. Ammonia also occurs in geothermal steam and is a toxic air contaminant with a pungent, penetrating odor. Ammonia is also a precursor pollutant to particulate matter in the ambient air. Releasing geothermal steam during well testing and development would cause substantial emissions of these toxic air contaminants and odors over the construction phase. Aside from closely managing the well testing schedule, few mitigation options are available, and the impact of toxic air contaminants and odors during construction would be significant and unavoidable.

Operational air emissions would result from vehicle use that would be necessary for periodic maintenance, repair, and inspection of the facilities. Operating a geothermal power facility generally causes very low or no emissions of CO_2 or other pollutants, except when geothermal steam escapes to the atmosphere. Geothermal steam can contain varying amounts of CO_2, methane, ammonia, and H_2S.

Extracting power from geothermal steam equipment can cause emissions of ammonia and H_2S, which are odors and toxic air contaminants present in the geothermal brine. Ammonia emissions also react with ambient air to form inhalable PM10, and H_2S in the atmosphere will oxidize to SO_2 and sulfuric acid. Without proper control, emissions of these contaminants would cause increased health risks, create objectionable odors, and cause or substantially contribute to violations of H_2S and/or PM10 ambient air quality standards. These contaminants would be emitted during any short-term commissioning activities or uncontrolled releases of geothermal steam, but these impacts would be less than significant because they would be short-term and managed in accordance with ICAPCD permitting requirements.

Ammonia and H_2S emissions could be avoided with sulfur control systems and use of an air-cooling system to reduce cooling tower drift. Commonly, water cooling causes the geothermal fluid entering the cooling tower to be emitted to the atmosphere as water vapor, which results in high levels of ammonia and H_2S in the vapor from the cooling tower. However, a binary cycle plant emits only fresh water vapor from the cooling tower. Cool geothermal brine is injected into the ground after the energy is extracted.

Comparison to Proposed Project

The construction emissions resulting from building two to five geothermal facilities would be similar to the type of construction emissions for the RSPP project. However, the two to five geothermal facilities would require fewer acres of ground disturbance. Operational emissions from the geothermal facilities would be greater than those of the proposed RSPP project because of the potential emissions of ammonia and H_2S. However, with mitigation, these impacts would be less than significant.

Biological Resources

The development and utilization of geothermal energy could have adverse impacts to vegetation and wildlife from the construction of well pads, wells, ponds, power plants, access roads, pipelines, transmission lines, other generation or transmission facilities, and any temporary extra workspace. Construction of geothermal projects would cause both temporary (during construction from vegetation clearing) and permanent (displacement of vegetation with project features) impacts to vegetation and wildlife habitat. Construction activities may also result in the alteration of soil conditions, including the loss of native seed banks and changes in topography and drainage, such that the ability of a site to support native vegetation after construction is impaired. Because the geothermal facilities would not require the entire geothermal field to be fenced, wildlife migration would potentially be allowed to continue.

Exploratory drilling and associated surface disturbances could cause soil to become contaminated with construction-related materials, such as oils, greases, hydraulic fluids, etc.

Comparison to Proposed Project

As with the RSPP project, the construction of two to five geothermal facilities would result in ground disturbance and loss of vegetation and wildlife habitat. However, the geothermal facilities would disturb fewer acres than the RSPP facility. Additionally, because the geothermal field would not require perimeter fencing as with the RSPP project, the impact to wildlife migration would be reduced. As such, the geothermal facilities would create fewer impacts to biological resources compared with the RSPP project.

Cultural Resources

Currently unknown, unrecorded cultural resources may be found at the geothermal facility sites. As they are discovered, resources are recorded and information retrieved. If the nature of the resource requires it, the resource is protected. When discovered, cultural resources are treated in accordance with applicable federal and state laws and regulations as well as the mitigation measures and permit requirements applicable to a project. As with RSPP site location, resources discovered during construction of current and future projects would be subject to legal requirements designed to protect them, thereby reducing the effect of impacts.

Comparison to Proposed Project

While the construction of two to five geothermal facilities would result in ground disturbance and could impact known and unknown cultural resources, the facilities

would disturb fewer acres than the RSPP facility. As such, it is likely that the geothermal facilities would create fewer impacts to cultural resources compared with the RSPP project.

Hazardous Materials

Soil or groundwater contamination could result from accidental spill or release of hazardous materials at the geothermal facility during operations or maintenance of the transmission line, towers, wells or power plant. This could result in exposure of the facility, maintenance workers, and the public to hazardous materials; and could result in contamination to soil and/or groundwater.

Geothermal plants can also produce waste and byproducts that can have significant impacts. The most potentially harmful gas generally encountered in geothermal systems is H_2S, which at concentrations higher than 30 parts per million (ppm) is toxic (CEC 2003). It can cause a variety of problems including dizziness, vomiting, and eventually death if one is exposed for long periods of time. In concentrations above 100 ppm, H_2S can be fatal. H_2S is heavier than air and can accumulate in low-lying areas (equipment pits, ravines, and other depressions) and become concentrated over time.

H_2S releases could potentially be of concern during drilling, well testing, and plant start-up and shut-down operations, although recent technology improvements in atmospheric separators can significantly decrease emissions and noise during these operations. H_2S is now often abated at geothermal power plants, resulting in a conversion of close to 100% of the H_2S into elemental sulfur (GEA 2007). Since 1976, H_2S emissions have decreased from 1,900 pounds per hour to 200 pounds per hour despite an increase in geothermal power production from 500 MW to 2,000 MW (GEA 2007).

Comparison to Proposed Project

Both the construction and operation of two to five geothermal facilities would require the use of H_2S. Because of the potentially harmful releases of H_2S with geothermal projects, impacts from hazardous materials would be greater for the geothermal facilities. However, with mitigation these impacts would likely be less than significant.

Land Use

The amount of land required for geothermal facilities varies greatly and is contingent in part on the geothermal resource below ground. The amount of ground disturbance for a geothermal facility is significantly smaller than the total amount of land required for the geothermal field, approximately 10%. Impacts to land use depend on the existing use of the land. For example, BLM lands within the Truckhaven area are open space areas. No sensitive land uses would be traversed by or adjacent to the Truckhaven Geothermal Leasing Area. However, the Truckhaven area is used by off-highway vehicles and would potentially create impacts to recreation (see the discussion of **Recreation and Wilderness** below).

Comparison to Proposed Project

Two to five geothermal facilities are expected to require over a thousand of acres of land similar to the RSPP facility. While a smaller portion of this land would be disturbed, the entire site would be converted to an industrial use, similar to that of the RSPP facility.

Recreation and Wilderness

The construction of pipelines, wells, storage yards, staging areas, power plants, transmission lines, and roads for geothermal facilities would reduce the amount of land available to recreationists for hiking, wildlife viewing, camping, and ORV use. For example, approximately 83% of the Truckhaven Geothermal Leasing Area is within the Ocotillo Wells State Vehicular Recreation Area (SVRA). Most vehicles gain access to the SVRA through OHV routes accessible via SR-78. Geothermal development in the area would restrict or reduce the opportunities for OHV vehicles to access certain areas of the SVRA during construction of geothermal wells and electric generation facilities.

Additionally, geothermal facilities would result in a long-term impact from the noise and vibration of the power plant and nearby pipelines. Views of equipment or the addition or change of industrial structures such as pipelines, power lines, and power production facilities conflict with the natural background of recreational resources in the desert and could also diminish users' recreational experiences on lands that remain open for recreation.

Comparison to Proposed Project

As with the RSPP facility, geothermal facilities constructed on Federal land could disrupt the use of recreation and wilderness lands.

Noise and Vibration

Construction of the proposed facilities would require heavy equipment operations for grading, filling, compacting, and paving. After site preparation, noise would be generated by well-boring equipment and by normal construction activities such as the use of power saws, drills, and hammers. Noise will be generated from drilling and testing operations at each well pad and would create both continuous and intermittent noise.

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the steam system, the piping and tubing that comprises the steam path has accumulated dirt, rust, scale and construction debris such as weld spatter, dropped welding rods and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. High pressure steam is then allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a steam blow, is quite effective at cleaning out the steam system. Such steam blows could produce noise as loud as 118 dBA at a distance of 100 feet. However, silencers can be used to reduce noise levels by up to 44 dBA (CEC 2003).

Well operations and energy generation would also contribute to increased noise levels. The principal noise sources would be turbine operations, noise generated from cooling tower, and associated project vehicles. However, at any distance greater than roughly 0.5 miles, power plant operation would generate noise levels indistinguishable from existing ambient noise levels.

Comparison to Proposed Project

Both geothermal facilities and the RSPP facility would require use of heavy equipment which would create construction noise. However, the drilling of the geothermal wells would likely require 24 hour drilling and the power plant would operate 24 hours a day, creating more daily noise. Additionally, the geothermal facility operation would require steam blows. The additional noise caused by the geothermal facilities would create greater noise impacts than the RSPP facility.

Public Health and Safety

Without meteorological conditions and topography at the specific geothermal sites, conclusions regarding air dispersion modeling and a human health risk assessment are not possible. The analysis for the Salton Sea Unit #6 resulted in a less than significant impact to public health and safety and this same analysis would be required for each of the two to five geothermal facilities required to achieve 250 MW of geothermal energy. Without more specific site analysis comparison with the proposed RSPP facility is not possible.

One additional concern regarding hazardous materials present in geothermal facilities includes the possibility for bacterial growth to occur in the cooling tower, including Legionella. Legionella is a type of bacteria that grows in water and causes Legionellosis, otherwise known as Legionnaires' disease. Untreated or inadequately treated cooling systems in the United States have been correlated with outbreaks of Legionellosis. These outbreaks are usually associated with building heating, ventilating, and air conditioning (HVAC) systems but it is possible for growth to occur in industrial cooling towers. In order to ensure that Legionella growth is kept to a minimum, mitigation would require the project owner to prepare and implement a biocide and anti-biofilm agent monitoring program to ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup. With the use of an aggressive antibacterial program coupled with routine monitoring and biofilm removal, the chances of Legionella growing and dispersing would be reduced to insignificance.

Comparison to Proposed Project

Without site specific information, a detailed comparison of the risk to public health and safety is not possible.

Socioeconomics and Environmental Justice

The socioeconomic impacts of building two to five geothermal facilities in Kern County would be similar to building and operating the RSPP project at the proposed site. The source of construction and operation workers would be similar and the estimated

benefits to Kern County would be similar. However, local county revenues from geothermal royalty and leasing revenues would be greater than revenues from a solar facility if legislation proposed by Senator Reid restoring language in the Energy Policy Act of 2005, which provided 50% of geothermal royalties to the state, 25% to the county and 25% to the federal government, is successful.

Soil and Water Resources

The construction activities associated with geothermal exploration and development have the potential for adverse impacts to surface water quality, especially through erosion of disturbed soil and resulting sedimentation. Accelerated wind and water-induced erosion may result from earthmoving activities associated with construction. Precipitation, or high intensity and short duration runoff events coupled with ground disturbing activities, can result in onsite erosion eventually increasing the sediment load into nearby waters. Soils devoid of vegetation have a high potential for erosion, particularly when disturbed. Background levels of erosion and sedimentation would also be high for the same reason.

A Stormwater Pollution Prevention Plan (SWPPP) would be required for construction of the geothermal facilities. This SWPPP will outline best management practices that will control sedimentation during construction. However, since the projects would involve extensive construction and grading over the site area, it is recommended that a drainage plan be developed to ensure minimal long-term disturbance to drainage patterns.

Excavation for geothermal wells and other project facilities, including tower foundations in shallow groundwater could contaminate groundwater if oil from excavation equipment is spilled into the excavation pit. However, per typical permit requirements, any facilities related to geothermal exploration and development must be designed with appropriate standards to protect against such releases.

A geothermal brine spill could adversely impact the soils surrounding pipelines. If a surface spill were to reach lands currently farmed, the soil would be rendered hypersaline and most likely unsuitable for agricultural purposes. It is likely that if a spill were to occur, such disturbance would be temporary, lasting only as long as remediation measures required.

The operation of the geothermal facilities and of wells, pipelines, and power facilities could cause indirect impacts to surface or groundwater quality due to a pipeline rupture, leakage, or failure from a surface impoundment or well casing leakage. Pipeline, pond, or well failures could be related to a seismic event. Any facilities related to geothermal exploration and development would be designed in accordance with appropriate standards to protect against such releases.

Geothermal facilities may require use of large amounts of fresh water. For example, the Salton Sea Unit #6 project would require approximately 293 AFY of fresh water during an average year, but could require up to 987 AFY if the brine were to reach a salinity of 25.0%. This would translate into approximately 490 AFY during an average year for 250 MW of geothermal facilities and up to 1,645 AFY. The use of 4,800 AFY from the Rose

Valley by the Coso geothermal project has raised concerns about impacts on a groundwater-fed lake, springs and wetlands and the wildlife associated with these habitats.

Comparison to Proposed Project

Impacts related to erosion and sedimentation for the two to five geothermal projects are assumed to be mitigable to less than significant because a geothermal facility requires much less ground disturbed than the RSPP facility and because there is flexibility when siting the geothermal plant structures and well pads. However, it should be noted that the geothermal facility would require a significantly greater amount of water than the RSPP facility during project operation. Overall, the geothermal facilities would create impacts to soils and water to the same degree as the proposed RSPP facility.

Traffic and Transportation

Before construction could occur at the geothermal facilities, a construction traffic control and transportation demand implementation program would need to be developed in coordination with Caltrans. This analysis may result in the need to limit construction-period truck and commute traffic to off-peak periods to avoid or reduce traffic and transportation impacts. These impacts would likely similar to those of the proposed project as the geothermal projects would likely require the use of Highway 395 and other smaller roads for access.

Comparison to Proposed Project

Impacts to traffic and transportation of the geothermal facilities would be similar to those at the proposed RSPP site, although the geothermal facilities would have no glare impacts to oncoming traffic.

Transmission Line Safety and Nuisance

Similar to the proposed project, this alternative would not be likely to cause transmission line safety hazards or nuisances. As stated in the **TRANSMISSION LINE SAFETY AND NUISANCE** section, the potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current standard industry practices, and the potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards, while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route. As with the proposed RSPP transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information.

Visual Resources

Geothermal facilities would require a power plant, production wells, injection wells, and pipelines to connect the wells to the plants. The wells would be approximately 15 feet high and the pipelines may run several miles (CEC 2003). The pipelines may be elevated up to three feet off the ground. The most visible features of geothermal projects would include the steam turbine generator and crane, crystallizers, cooling towers, dilution water heaters, and emergency relief tanks (CEC 2003). The transmission interconnection and switchyards would also be visible components of a geothermal facility.

Construction of geothermal power plant and linear facilities would cause temporary adverse visual impacts due to the presence of equipment, materials, and workforce. Construction would involve the use of cranes, heavy construction equipment, temporary storage and office facilities, and temporary laydown/staging areas. Construction would include site clearing and grading, trenching, construction of the actual facilities, and site and rights-of-way cleanup and restoration.

Geothermal projects would introduce the prominent geometric forms and vertical and horizontal lines of the various structures and stacks. These structural characteristics would be consistent with the forms and lines related to any existing industrial facilities and would contrast with natural forms and lines present in the setting. The wells and pipelines would be visible to motorists and agricultural workers in the local area, particularly if they are incased in shiny aluminum jackets or are painted with reflective paint.

Geothermal facilities would likely require nighttime lighting for operational safety and security though not FAA beacons. Lighting would be directed on site to avoid back-scatter, and shielded from public view to the extent practical. High illumination areas not occupied on a regular basis would be provided with switches or motion detectors to light these areas only when occupied.

Visible plumes from cooling towers would occur. The resulting visual contrast would be high and the power plant and cooling tower would appear co-dominant compared to the surrounding landforms. Geothermal unabated dilution water heater plume may be a somewhat prominent and persistent feature in the views from sections of local roads and residences.

Comparison to Proposed Project

Geothermal facilities would introduce industrial facilities into what may be predominantly natural settings. Additionally, geothermal facilities may have visible plumes that rise hundreds of feet into the air. Their location in remote areas used for recreation could result in additional impacts. However, the permanent facilities required for a geothermal facility would be much less extensive than those required at the RSPP project with thousands of parabolic troughs approximately 20 feet tall and additional structures, up to 120 feet tall. As such, visual impacts of the RSPP facility would likely be similar to those of geothermal power facilities.

Waste Management

The minimal amounts of nonhazardous waste generated from geothermal projects, would be disposed of in a Class III waste disposal site. The brine pond solids would constitute the largest percentage of waste at geothermal facilities. Brine pond solids and scale found in pipes, clarifiers, and separators during maintenance shutdowns would be disposed of as hazardous waste in a Class I landfill. The drilling waste and H_2S abatement waste would be tested and, if found hazardous, would be disposed of in a Class I landfill.

Comparison to Proposed Project

The environmental impacts of waste disposal at geothermal facilities would be similar to those at the proposed RSPP site and would not be expected to create significant impacts.

Worker Safety and Fire Protection

Industrial environments are potentially dangerous, during both construction and operation of facilities. Workers at the proposed project would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress problems. The workers may experience falls, trips, burns, lacerations, and numerous other injuries. They have the potential to be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks and electrocution. It is important for the facilities to have well-defined policies and procedures, training, and hazard recognition and control at their facility to minimize such hazards and protect workers. If the facility complies with all LORS, workers would be adequately protected from health and safety hazards (CEC 2003).

During construction and operation of the geothermal facilities there is the potential for both small fires and major structural fires. Electrical sparks, combustion of fuel oil, flammable gas or liquids, explosions, and over-heated equipment, may cause small fires. Major structural fires may develop from uncontrolled fires or be caused by large explosions of flammable gasses or liquids. Compliance with all LORS would be adequate to assure protection from all fire hazards.

Comparison to Proposed Project

The environmental impact of worker safety and fire protection at geothermal facilities sites would be similar to that at the proposed RSPP site.

Engineering Assessment

Facility Design

This analysis encompasses the civil, structural, mechanical and electrical engineering design of a project. It is assumed that each renewable technology would abide by the required LORS for that facility and would comply with the California Building Standards Code.

Geology, Paleontology and Minerals

Active seismicity and subsidence generally occur in areas with high levels of tectonic activity (e.g., volcanic regions, fault zones), which are the same areas in which geothermal resources occur; therefore, it is difficult to discern between power plant-induced and naturally occurring seismicity and subsidence. Drilling deep into the earth's crust to access high-temperature geothermal resources and subsequent re-injection of fluid into the geothermal reservoir may result in microearthquakes, which are generally below magnitude 2-3 on the Richter scale. These microearthquakes are typically centered on the injection site and are too low to be noticed by humans (Kagel 2007).

The applicant would follow all applicable building codes and standard practices for power plant construction as required by the CEC including: Title 24, California Code of Regulations, which adopts the current edition of the CBC as minimum legal building standards; the 2001 California Building Code (CBC) for design of structures; the 1996 Structural Engineers Association of California's Recommended Lateral Force Requirements, for seismic design; ASME-American Society of Mechanical Engineers Boiler and Pressure Vessel Code, and the NEMA-National Electrical Manufacturers Association.

Subsidence can occur naturally or through the extraction of subsurface fluids, including geothermal fluids. Subsidence has been proven to be effectively mitigated through injection of spent geothermal fluids into the underground reservoir (CEC 2003a). Injection is regulated by the U.S. Environmental Protection Agency (EPA) to adhere to requirements of the Underground Injection Control Program.

Site specific information regarding mineral resources and paleontological resources would be required. However, it is likely that should mineral resources and paleontological resources be present, mitigation would be required to reduce the impacts to less than significant. This is because both mineral and paleontological resources could be avoided through the flexible siting of the project infrastructure.

Comparison to Proposed Project

Geothermal facilities sites would create greater impacts to geologic resources because they are known to create microearthquakes through the development of the technology.

Power Plant Efficiency

Both geothermal facilities and the RSPP project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. They would not create significant adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply, and would not consume fossil fuel energy in a wasteful of inefficient manner.

Power Plant Reliability

Geothermal facilities may achieve a 95% or higher availability (CEC 2003). Because the geothermal steam is available throughout the day, geothermal facilities provide an adequate level of reliability throughout the entire day.

Comparison to Proposed Project

Compared to solar energy, geothermal facilities provide a higher reliability because of their ability to provide base load energy throughout the entire day, whereas solar projects can generate power only when the sun is shining.

Transmission System Engineering

The geothermal facilities would require evaluating the capacity of the transmission lines that would be used for interconnection. The geothermal facilities may cause adverse effects to the transmission system and require system upgrades.

Summary of Impacts – Geothermal Technology

Geothermal facilities would have impacts similar to the proposed RSPP project for 13 of the 20 environmental and engineering resource elements: land use, recreation and wilderness, public health and safety, socioeconomics, soil and water resources, traffic and transportation, transmission line safety and nuisance, visual, waste management, worker safety and fire protection, facility design, power plant efficiency, and transmission system engineering.

Geothermal generation would likely have greater impacts than the proposed RSPP site for four resource elements: air quality, hazardous materials, noise and vibration, and geology, paleontology and minerals.

Geothermal generation would likely have fewer impacts than the proposed RSPP site for three resources: biological resources, cultural resources, and power plant reliability.

Rationale for Elimination

Geothermal generation is a commercially available technology and is important for California's renewable energy future because it provides baseload power that is available 24 hours a day. It also can be developed with substantially less ground disturbance than that needed for the RSPP project, so impacts related to biological and cultural resources would be reduced. However, despite the encouragement provided by Renewable Portfolio Standard targets and ARRA funding, no geothermal projects are included on the Renewable Energy Action Team list of projects requesting ARRA funds. No geothermal projects may be expected in the future, however, particularly in Inyo County. Therefore, while the technology is clearly feasible and additional development is expected, the technology is not retained for detailed analysis in this SA/DPA/DEIS.

Biomass Energy

Electricity can be generated by burning organic fuels in a boiler to produce steam, which then turns a turbine; this is biomass generation. Biomass can also be converted into a fuel gas such as methane and burned to generate power. Wood is the most commonly used biomass for power generation. Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing wastes, and construction and urban wood wastes. Several techniques are used to convert these fuels to electricity, including direct combustion, gasification, and anaerobic fermentation. Biomass facilities do not require the extensive amount of land required by the other renewable energy sources discussed, but they generate much smaller amounts of electricity.

Currently, nearly 19% of the state's renewable electricity derives from biomass and waste-to-energy sources (CEC 2007). Most biomass plant capacities are in the 3- to 10-MW range and typically operate as baseload capacity. Kern County currently has one proposed biomass project (44 MW), the Mt. Poso Cogeneration Company project (CEC 2010a). The average size of a sales generation biomass plant is 21 MW (CBEA 2008). Unlike other renewable sources, the locational flexibility of biomass facilities would reduce the need for substantial transmission investments. Solid fuel biomass (total of 555 MW) makes up about 1.75% of the state's electricity, and landfill methane gas generation (total of 260 MW) makes up about 0.75%. Existing landfills not now producing electricity from gas could add a maximum of about 170 MW of new generation capacity (CBEA 2008).

Environmental Assessment

Generally, small amounts of land are required for biomass power facilities; however, a biomass facility should be sited near a relatively large source of biomass to minimize the cost and truck emissions associated with bringing the biomass waste to the facility. Operational noise impacts may be a concern, originating from truck engines entering and exiting the facility repeatedly on a daily basis. Other operations of the biomass facilities, while internal to the main structure, can result in increased noise due to the material grinding equipment.

The emissions due to biomass fuel-fired power plant operation are generally unavoidable. Direct impacts of criteria pollutants could cause or contribute to a violation of the ambient air quality standards. Significant impacts can potentially occur for PM10 and ozone because emissions of particulate matter and precursors and ozone precursors could contribute to existing violations of the standards for those criteria pollutants. Biomass/biogas facility emissions could also adversely affect visibility and vegetation in federal Class I areas or state wilderness areas as a result of significantly deteriorating air quality related values in the wilderness areas. Toxic air contaminants from routine operation would also cause health risks that could adversely affect sensitive receptors in the local area of the plant.

Rationale for Elimination

Most biomass facilities produce only small amounts of electricity (in the range of 3 to 10 MW) and so could not meet the project objectives. Biomass facilities also generate significant air emissions and require numerous truck deliveries to supply the plants with the biomass waste materials. Also, in waste-to-energy facilities, there is some concern regarding the emission of toxic chemicals, such as dioxin, and the disposal of the toxic ash that results from biomass burning. Therefore, this technology is not analyzed in detail in this SA/DPA/DEIS as an alternative to the RSPP project.

Tidal Energy

The oldest technology to harness tidal power for the generation of electricity involves building a dam, known as a *barrage*, across a bay or estuary that has large differences in elevation between high and low tides. Water retained behind a dam at high tide generates a power head sufficient to generate electricity as the tide ebbs and water released from within the dam turns conventional turbines.

Certain coastal regions experience higher tides than others. This is a result of the amplification of tides caused by local geographical features such as bays and inlets. In order to produce practical amounts of power for tidal barrages, a difference between high and low tides of at least 5 meters is required. There are about 40 sites around the world with this magnitude of tidal range. The higher the tides, the more electricity can be generated from a given site and the lower the cost of the electricity produced. Worldwide, existing power plants using tidal energy include a 240-MW plant in France, a 20-MW plant in Nova Scotia, and a 0.5-MW plant in Russia (EPRI 2006).

Tidal Fences

Tidal fences are effectively barrages that completely block a channel. If deployed across the mouth of an estuary, they can be very environmentally destructive. However, in the 1990s, their deployment in channels between small islands or in straights between the mainland and islands has increasingly been considered a viable option for the generation of large amounts of electricity.

The advantage of a tidal fence is that all the electrical equipment (generators and transformers) can be kept high above the water. Also, by decreasing the cross-section of the channel, current velocity through the turbines is significantly increased.

The United Kingdom is currently considering the feasibility of tidal energy across the Bristol Channel. The feasibility study began with the consideration of the Severn tidal barrage. The barrage would work similarly to a dam which generates hydro electric power by holding water back before it is allowed to flow at speed through a pipe at the base of the dam to drive the turbines (BBC 2007). Since then, alternative tidal projects have been proposed, including a tidal fence that would allow shipping to move freely and keep ports at Cardiff and Bristol open (BBC 2008). The results of the feasibility study are expected to be published in 2010; however, preliminary results from the Sustainable Development Commission confirmed the potential of the huge Severn tidal range to generate approximately 5% of United Kingdom’s electricity (BIS 2009).

Tidal Turbines

Tidal turbines are the chief competition to the tidal fence. Looking like an underwater wind turbine, they offer a number of advantages over the tidal fence. They are less disruptive to wildlife, allow small boats to continue to use the area, and have much lower material requirements than tidal fences.

Tidal turbines function well where coastal currents run at 2 to 2.5 meters per second (slower currents tend to be uneconomic while larger ones stress the equipment). Such currents provide an energy density four times greater than air, meaning that a 15-meter-diameter turbine will generate as much energy as a 60-meter-diameter windmill. In addition, tidal currents are both predictable and reliable, a feature which gives them an advantage over both wind and solar systems. The tidal turbine also offers significant environmental advantages over wind and solar systems because the majority of the assembly is hidden below the waterline and all cabling is along the sea bed.

There are many sites around the world where tidal turbines could be effectively installed. An ideal site is close to shore (within 1 kilometer) in water depths of about 20

to 30 meters. In April 2007, the first major tidal-power project was installed in the United States off New York City's Roosevelt Island (Fairley 2007). Turbines such as those used in New York City use in-flow turbines, thereby lessening the environmental impacts. A study conducted in 2006, *System Level Design, Performance, Cost and Economic Assessment – San Francisco Tidal In-Stream Power Plant*, concluded that a tidal plant located under the Golden Gate Bridge could create approximately 35 MW of power with no significant impacts to the environment and recommended further research and development into both ocean energy technology and a pilot project in San Francisco (EPRI 2006a).

Environmental Assessment

Tidal technologies, especially tidal fences, have the potential to cause significant biological impacts, especially to marine species and habitats. Fish could be caught in the unit's fins by the sudden drop in pressure near the unit. The passageways, more than 15 feet high and probably sitting on a bay floor, could squeeze out marine life that lives there or alter the tidal flow, sediment build-up, and the ecosystem in general. Even the in-flow turbines can have adverse impacts on marine systems. The in-flow turbines off New York City must undergo environmental monitoring for 18 months to ensure the turbines will not create adverse impacts to the river's marine wildlife. Also, depending on the location of the tidal technology, commercial shipping could be disrupted during construction.

The reduced tidal range (difference between high and low water levels) resulting from tidal energy generation can destroy inter-tidal habitat used by wading birds. Sediment trapped behind the barrage could also reduce the volume of the estuary over time.

Rationale for Elimination

Tidal fence technology is a commercially available technology in Europe, although limited to areas that are adjacent to a body of water with a large difference between high and low tides, and it can result in significant environmental impacts to ocean ecosystems. In-flow tidal turbines are a relatively new technology and are not considered an alternative to the RSPP project because they are an unproven technology at the scale that would be required to replace the proposed project. Additionally, the potential for adverse impacts of tidal turbines is still under review, as demonstrated by the pilot project under environmental monitoring in New York. Therefore, this technology is not analyzed in detail in this SA/DPA/DEIS as an alternative to the RSPP project.

Wave Energy

Wave power technologies have been used for nearly 30 years. Setbacks and a general lack of confidence have contributed to slow progress towards proven devices that would have a good probability of becoming commercial sources of electrical power using wave energy.

The highest energy waves are concentrated off the western coasts of the United States in the 40^{o} to 60^{o} latitude range north and south. The power in the wave fronts varies in these areas between 30 and 70 kilowatts per meter (kW/m) with peaks to 100 kW/m in the Atlantic southwest of Ireland, the Southern Ocean and off Cape Horn. Many wave energy devices are still in the research and development stage and would require large

amounts of capital to get started. Additional costs from permitting and environmental assessments also make wave energy problematic (WEC 2007). Nonetheless, wave energy is likely to increase in use within the next 5 to 10 years.

The total power of waves breaking on the world's coastlines is estimated at 2 to 3 million MW. In favorable locations, wave energy density can average 65 MW per mile of coastline. Three approaches to capturing wave energy are:

- Floats or Pitching Devices. These devices generate electricity from the bobbing or pitching action of a floating object. The object can be mounted to a floating raft or to a device fixed on the ocean floor.
- Oscillating Water Columns. These devices generate electricity from the wave-driven rise and fall of water in a cylindrical shaft. The rising and falling water column drives air into and out of the top of the shaft, powering an air-driven turbine.
- Wave Surge or Focusing Devices. These shoreline devices, also called tapered channel or tapchan systems, rely on a shore-mounted structure to channel and concentrate the waves, driving them into an elevated reservoir. Water flow out of this reservoir is used to generate electricity, using standard hydropower technologies.

In December 2007, PG&E signed a power purchase agreement with Finavera Renewables, which had planned to operate a wave farm approximately 2.5 miles off the coast of Eureka, California. The agreement was for 2 MW of power beginning in 2012. On October 16, 2008, the California Public Utilities Commission rejected PG&E's request for approval of a renewable resource procurement contract with Finavery Renewables because, among other reasons, the CPUC concluded the project had not been shown to be viable. As stated in that decision, there is significant uncertainty surrounding wave technology and the wave energy industry is at a beginning stage (CPUC 2008). The CPUC did authorize up to $4.8 million for PG&E to undertake its WaveConnect project in Decision D.09-01-036. WaveConnect is designed to document the feasibility of a facility that converts wave energy into electricity by using wave energy conversion (WEC) devices in the open ocean adjacent to PG&E's service territory.

In January 2010, the California State Lands Commission and the Federal Energy Regulatory Commission issued a Request for Statements of Interest to prepare an environmental document for the PG&E WaveConnect project discussed above. PG&E has selected a wave energy project siting area that is between 2.5 and 3.0 nautical miles (nm) from the shore in Humboldt County. WaveConnect consists of: (1) wave energy converters (WECs) including multi-point catenary moorings and anchors; (2) marker buoys, navigation lights, and environmental monitoring instruments; (3) subsea electrical cables extending on-shore to (4) land-based power conditioning equipment; (5) an above-ground transmission line and interconnection to the electrical grid; (6) data acquisition and telemetry equipment; and (7) security and safety equipment.

Environmental Assessment

The environmental impacts of wave power have yet to be fully analyzed. A recent study published by the U.S. Department of Commerce and National Oceanic and Atmospheric

Administration listed a number of potentially significant environmental impacts created by wave power (Boehlert 2008):

- Significant reduction to waves with possible effects to beaches (e.g. changes to sediment transport processes).
- The use of buoys may have positive effects on forage fish species, which in turn could attract larger predators. Structures need to be designed to reduce the potential entanglement of larger predators, especially marine turtle species.
- Modifications to water circulation and currents may result in changes to larval distribution and sediment transport.
- Wave energy development may affect community structures for fish and fisheries.
- Lighting and above-water structures may result in marine bird attraction and collisions and may alter food webs and beach processes.
- A diversity of concerns would arise regarding marine mammals including entanglement issues.
- Energy-absorbing structures may affect numerous receptors and should avoid sensitive habitats.
- Potential hazards from chemicals used in the process must be addressed both for spills and for a continuous release such as in fouling paints.
- New hard structures and lighting may break loose and increase debris accumulation.
- Impacts on fish and marine mammals caused by noise coming from the buoys should be understood and mitigated.
- Electromagnetic effects may affect feeding or orientation and should be better understood.
- Impact thresholds need to be established. As projects scale up in location or implementation, new risks may become evident.

Rationale for Elimination

Wave energy is new and may not be technologically feasible; as stated above, PG&E is proposing to sponsor a project to test the feasibility of harnessing wave energy. Additionally, wave power must be located where waves are consistently strong; even then, the production of power depends on the size of waves, which result in large differences in the amount of energy produced. Wave technology is not considered an alternative to the RSPP project because is an unproven technology at the scale that would be required to replace the proposed project and because it may also result in substantial adverse environmental impacts. Therefore, this technology is not analyzed in detail in this SA/DPA/DEIS as an alternative to the RSPP project.

B.2.8.4 Alternative Methods of Generating or Conserving Electricity

Nonrenewable generation technologies that require use of natural gas, coal, or nuclear energy would not achieve the key project objective for the proposed RSPP project to provide clean, renewable, solar-powered electricity and to assist SCE in meeting its obligations under California's Renewable Portfolio Standard Program.

While these generation technologies would not achieve this key objective, they are described briefly in this section to present this information to the public and decision makers. Conservation and demand-side management are also briefly addressed in this section.

The following topics were considered in this analysis:

- Natural gas
- Coal
- Nuclear energy
- Conservation and demand-side management

Of the three nonrenewable generation alternatives (natural gas, coal, and nuclear), only natural gas-fired power plants would be viable alternatives within California. However, gas-fired plants would fail to meet a major project objective to construct and operate a renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities and would therefore not achieve the purpose and need of the project. Because these alternatives would not support renewable power generation within California, and could have significant environmental impacts of their own, they were eliminated from further consideration.

Natural Gas Generation

Natural gas power generation accounts for approximately 22% of all the energy used in the United States and comprises 40% of the power generated in California (CEC 2007). Natural gas power plants typically consist of combustion turbine generators, heat recovery steam generators, a steam turbine generator, wet or dry cooling towers, and associated support equipment. An interconnection with a natural gas pipeline, a water supply, and electric transmission are also required. A gas-fired power plant generating 250 MW would generally require about 10 acres of land.

Environmental Assessment

Natural gas power plants may result in numerous adverse environmental impacts such as the following.

- Overall air quality impacts would increase because natural gas-fired power plants can contribute to local violations of the PM10 and ozone air quality standards, and operational emissions could result in toxic air contaminants that could adversely affect sensitive receptors. Net increases in greenhouse gas emissions due to natural gas-firing in the conventional power plants would also be substantial.
- Environmental justice may be a concern. Gas-fired power plants tend to be located in developed urban areas that are zoned for heavy industry. In some instances, low-income and minority populations are also located in such areas.
- To avoid adverse land use impacts, natural gas-fired power plants must be consistent with local jurisdictions' zoning.
- Several hazardous materials, including regulated substances (aqueous ammonia, hydrogen, and sulfuric acid), would be stored at a natural gas power plant during

- Cultural impacts can be severe depending on the power plant siting; however, because natural gas power plants require substantially fewer acres per MW of power generated, impacts to cultural resources would be expected to be fewer than with solar facilities.
- Power plant siting may result in the permanent conversion of designated farmland to non-agricultural uses. However, because natural gas power plants require substantially fewer acres per MW of power generated, impacts to designated farmlands would be expected to be less than with solar facilities.
- Visual impacts may occur with natural gas power plants because they introduce large structures with industrial character. The most prominent structures are frequently the cooling towers, which may reach 100 feet tall, and the power plant stacks, which may reach over 100 feet tall. Visible plumes from the cooling tower would also potentially occur.

Rationale for Elimination

Although natural gas generation is clearly a viable technology, it is not a renewable technology, so it would not attain the objective of generating renewable power meeting California's renewable energy needs. The air quality impacts of gas-fired plants include greenhouse gases and are one major reason that California's Renewable Portfolio Standard was developed. Therefore, this alternative is not considered in detail as an alternative to the RSPP project and is not analyzed further in this SA/DPA/DEIS.

Coal Generation

Coal-fired electric generating plants are the cornerstone of America's electric power generation system. Traditional coal-fired plants generate large amounts of greenhouse gases. New efforts to develop cleaner coal technology including processes that reduce air emissions and other pollutants from coal-burning power plants are in various phases of research and design. The Clean Coal Power Initiative is providing government co-financing for new coal technologies that help utilities meet the Clear Skies Initiative to cut sulfur, nitrogen, and mercury pollutants by nearly 70% by 2018. The Clean Coal Power Initiative is now focusing on developing projects that use carbon sequestration technologies and/or beneficial reuse of carbon dioxide (DOE 2008). However, these technologies are not yet in use and from initial mining of coal to final disposal of waste fly ash, coal creates significant adverse impacts to the environment and human health.

In 2006, approximately 15.7% of the energy used in California came from coal fired sources; 38% of this was generated in state, and 62% was imported (CEC 2007). The in-state coal-fired generation includes electricity generated from out-of-state, coal-fired power plants owned by and reported by California utilities (CEC 2007). In 2006, California enacted Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006), which

prohibits utilities from making long-term commitments for electricity generated from plants that create more carbon dioxide (CO_2) than clean-burning natural gas plants (CEC 2007).

Environmental Assessment

Coal-fired power plants may also result in numerous adverse environmental impacts such as the following.

- Overall, air quality impacts would increase because coal-fired power plants contribute carbon dioxide, sulfur dioxide, nitrogen oxides, mercury, and fly ash (USEPA 2008a). Mining, cleaning, and transporting coal to the power plants generates additional emissions. Average per megawatt hour emissions of a coal-fired power plant are 2,249 pounds of carbon dioxide, 13 pounds of sulfur dioxide and 6 pounds of nitrogen oxides (USEPA 2008a). Net increases in greenhouse gas emissions due to coal-firing in conventional power plants would be significant.
- Health risks associated with power plants have also been documented, including problems associated with exposure to fine particle pollution or soot, an increase in asthma, and an increase in non-fatal heart attacks.
- Large quantities of water are generally required to produce steam and for cooling. When coal-fired power plants use water from a lake or river, fish or other aquatic life can be adversely impacted (USEPA 2008).

Rationale for Elimination

Although coal generation is a viable technology, it is not a renewable technology, so it would not attain the objective of generating renewable power meeting California's renewable energy needs. Existing technology for coal-fired plants results in high greenhouse gas emissions. Therefore, coal generation was eliminated from detailed analysis and is not considered further in this SA/DPA/DEIS.

Nuclear Energy

Due to environmental and safety concerns, California law currently prohibits the construction of new nuclear power plants in the state until the California Energy Commission finds that the federal government has approved and there exists a demonstrated technology for the permanent disposal of spent fuel from these facilities (CEC 2006). In June 1976, California enacted legislation directing the Energy Commission to perform an independent investigation of the nuclear fuel cycle. This investigation was to assess whether the technology to reprocess nuclear fuel rods or to permanently dispose of high-level nuclear waste had been demonstrated and approved and was operational (Public Resources Code 25524.1 (a) (1), 25524.1 (b), and 25524.2 (a)). After extensive public hearings, the Energy Commission determined that it could not make the requisite affirmative findings concerning either reprocessing of nuclear fuel or disposal of high-level waste as documented in the *Status of Nuclear Fuel Reprocessing, Spent Fuel Storage and High-level Waste Disposal*, Energy Commission publication P102-78-001 (January 1978.) As a result, the development of new nuclear energy facilities in California was prohibited by law.

It has been more than 25 years since the last comprehensive Energy Commission assessment of nuclear power issues. The *Nuclear Power in California: 2007 Status Report* (October 2007) provides a detailed description of the current nuclear waste issues and their implications for California. This was prepared as part of the development of the Energy Commission's *2007 Integrated Energy Policy Report* (CEC 2007a).

Rationale for Elimination

The permitting of new nuclear facilities in California is currently illegal, so this technology is infeasible and is not considered further in this SA/DPA/DEIS.

Conservation and Demand-Side Management

Conservation and demand-side management consist of a variety of approaches to reduction of electricity use, including energy efficiency and conservation, building and appliance standards, and load management and fuel substitution. In 2005 the Energy Commission and CPUC's Energy Action Plan II declared cost effective energy efficiency as the resource of first choice for meeting California's energy needs. The Energy Commission noted that energy efficiency has helped flatten the state's per capita electricity use and saved consumers more than $56 billion since 1978 (CPUC 2008). The investor-owned utilities' 2006-2008 efficiency portfolio marks the single-largest energy efficiency campaign in U.S. history, with a $2 billion investment by California's energy ratepayers (CPUC 2008). However, with population growth, increasing demand for energy, and the need to reduce greenhouse gases, there is a greater need for energy efficiency.

The CPUC, with support from the Governor's Office, the Energy Commission, and the California Air Resources Board, among others, adopted the *California Long-Term Energy Efficiency Strategy Plan for 2009 to 2020* (CPUC 2008). The plan is a framework for all sectors in California including industry, agriculture, large and small businesses, and households. Major goals of the plan include:

- All new residential construction will be zero net energy by 2020;
- All new commercial construction will be zero net energy by 2030;
- Heating, ventilation, and air conditioning industries will be re-shaped to deliver maximum performance systems;
- Eligible low-income customers will be able to participate in the Low Income Energy Efficiency program and will be provided with cost-effective energy efficiency measures in their residences by 2020.

Rationale for Elimination

Conservation and demand-side management are important for California's energy future and cost effective energy efficiency is considered as the resource of first choice for meeting California's energy needs. However, with population growth and increasing demand for energy, conservation and demand-management alone are not sufficient to address all of California's energy needs. Additionally, it will not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements, so

technologies, like solar thermal generation, would be required. Therefore, they are not analyzed in detail in this SA/DPA/DEIS as an alternative to the RSPP project.

B.2.9 CONCLUSIONS OF ALTERNATIVES ANALYSIS

In this analysis of the RSPP project, 26 alternatives to the proposed RSPP project were developed and evaluated. These include three modifications of the project at the RSPP site, no action/no project alternatives, a solar PV facility at the RSPP site, five alternative sites, solar and renewable technologies, generation technologies using different fuels, and conservation/demand-side management.

Of the three modifications at the RSPP site, the Northern Unit Alternative and the Southern Unit Alternative would reduce impacts in comparison to the proposed project but would still result in significant adverse impacts to biological resources that cannot be mitigated. These alternatives would meet most the project objectives (though reducing the generation capacity), but would not attain the purpose and need for the project. The Original Proposed Project Alternative would meet project objectives and the purpose and need for the project but would increase impacts in comparison to the proposed project.

Energy Commission staff consider the No Project/No Action Alternative to be superior to the proposed project. While it would eliminate the potential for 250 MW of additional solar thermal power created using parabolic trough technology at the RSPP site and thus not meet project objectives, it would eliminate significant immitigable visual and biological resource impacts associated with the RSPP project. New renewable resources may be developed to meet the State's RPS requirements in the absence of the RSPP project.

Alternatives Table 3 identifies the impacts from the four NEPA/CEQA Alternatives and the No Project/No Action Alternative as determined in the technical areas discussed in Sections C and D.

Alternatives Table 3
Impact Comparison of NEPA/CEQA Alternatives

Alternative	Proposed Project	Northern Unit	Southern Unit	Original Project	No Project/ No Action
Technical Area					
Air Quality	• Less than significant impacts with mitigation. • Cumulative impacts less than significant with mitigation.	• Less than significant impacts with mitigation. • Cumulative impacts less than significant with mitigation.	• Less than significant impacts with mitigation. • Cumulative impacts less than significant with mitigation.	• Less than significant impacts with mitigation. • Cumulative impacts less than significant with mitigation.	• No Impact
Biological Resources	• Significant, immitigable impacts to desert tortoise and MGS and habitat linkages. • Significant cumulative impacts to desert tortoise, MGS and habitat linkages.	• Significant, immitigable impacts to desert tortoise and MGS and habitat linkages. • Significant cumulative impacts to desert tortoise, MGS and habitat linkage.	• Significant, immitigable impacts to desert tortoise and MGS and habitat linkages. • Significant cumulative impacts to desert tortoise, MGS and habitat linkage.	• Significant, immitigable impacts to desert tortoise and MGS and habitat linkages. • Significant cumulative impacts to desert tortoise, MGS and habitat linkage.	• No Impact
Cultural Resources	• Significant impacts to Last Chance Canyon Archeological District, El Paso Mountains Native American sacred lands site and 17 assumed eligible archeological sites; however, less than significant with mitigation (BLM-SHPO-CEC Programmatic agreement).	• Less than significant impacts with mitigation.	• Less than significant impacts with mitigation.	• Less than significant impacts with mitigation.	• No Impact

Alternative	Proposed Project	Northern Unit	Southern Unit	Original Project	No Project/ No Action
Hazardous Materials	• Less than significant impacts with mitigation.	• Less than significant impacts with mitigation.	• Less than significant impacts with mitigation.	• Less than significant impacts with mitigation.	• No Impact
Land Use, Recreation & Wilderness	• Less than significant impacts to Recreation with mitigation.	• Less than significant impacts to Recreation with mitigation.	• Less than significant impacts to Recreation with mitigation.	• Less than significant impacts to Recreation with mitigation.	• No Impact
Noise & Vibration	• Impacts from construction less than significant with mitigation. • Less than significant impacts during operation.	• Impacts from construction less than significant with mitigation. • Less than significant impacts during operation.	• Impacts from construction less than significant with mitigation. • Less than significant impacts during operation.	• Impacts from construction less than significant with mitigation. • Less than significant impacts during operation.	• No Impact
Public Health & Safety	• Less than significant Impacts.	• Less than significant Impacts.	• Less than significant Impacts.	• Less than significant Impacts.	• No Impact
Socioeconomics & Environmental Justice	• Less than significant impacts. • Beneficial impacts to local employment, local business and local government.	• Less than significant impacts.	• Less than significant impacts.	• Less than significant impacts. • Beneficial impacts to local employment, local business and local government.	• No Impact
Soil & Water Resources	• Significance determination of impacts to Project from flash flooding and mass erosion cannot be made at this time. • Significance determination of impacts to groundwater levels in the IWVGB cannot be made at this time. • Significant	• Significant impacts to onsite drainage systems, less than proposed project.	• Significant impacts to onsite drainage systems, less than proposed project.	• Significant impacts from soil and wind erosion, greater than proposed project. • Significant impacts to onsite and offsite (El Paso wash) drainage systems.	• No Impact

Alternative	Proposed Project	Northern Unit	Southern Unit	Original Project	No Project/ No Action
	impact to onsite drainage systems. • Temporary cumulative impacts to surface water hydrology, due to grading and construction of drainage channels within the flood plain.				
Traffic & Transportation	• Less than significant impacts to collision rate at US 395 & China Lake Blvd with proposed mitigation. • Less than significant impacts to motorists from glare with proposed mitigation. • Potential cumulative impacts to traffic, routes and patterns. • Impacts to military operations from vapor plumes cannot be determined at this time.	• Less than significant impacts to collision rate at US 395 & China Lake Blvd with proposed mitigation. • Less than significant impacts to motorists from glare with proposed mitigation. • Potential cumulative impacts to traffic, routes and patterns.	• Less than significant impacts to collision rate at US 395 & China Lake Blvd with proposed mitigation. • Less than significant impacts to motorists from glare with proposed mitigation. • Potential cumulative impacts to traffic, routes and patterns.	• Less than significant impacts to collision rate at US 395 & China Lake Blvd with proposed mitigation. • Less than significant impacts to motorists from glare with proposed mitigation. • Potential cumulative impacts to traffic, routes and patterns.	• No Impact
Transmission Line Safety and Nuisance	• Less than significant impacts with mitigation.	• Less than significant impacts with mitigation.	• Less than significant impacts with mitigation.	• Less than significant impacts with mitigation.	• No Impact
Visual Resources	• Significant, immitigable impacts from glare, affecting day and night views and	• Significant, immitigable impacts from glare • Significant, immitigable	• Significant, immitigable impacts from glare • Significant, immitigable	• Significant, immitigable impacts from glare • Significant, immitigable	• No Impact

Alternative	Proposed Project	Northern Unit	Southern Unit	Original Project	No Project/ No Action
	significant impacts to quality and character of viewshed. • Significant, immitigable cumulative impacts to viewshed.	cumulative impacts to viewshed.	cumulative impacts to viewshed.	cumulative impacts to viewshed.	
Waste Management	• Less than significant Impacts on landfill capacity.	• Less than significant Impacts on landfill capacity.	• Less than significant Impacts on landfill capacity.	• Less than significant Impacts on landfill capacity.	• No Impact
Worker Safety	• Less than significant impact on local fire protection with mitigation. • Less than significant cumulative impact on local fire protection with mitigation.	• Less than significant impact on local fire protection with mitigation. • Less than significant cumulative impact on local fire protection with mitigation.	• Less than significant impact on local fire protection with mitigation. • Less than significant cumulative impact on local fire protection with mitigation.	• Less than significant impact on local fire protection with mitigation. • Less than significant cumulative impact on local fire protection with mitigation.	• No Impact
Facility Design	• N/A	• N/A	• N/A	• N/A	• N/A
Geo/Paleo Resources	• Less than significant impacts to Geologic Hazardous (ground shaking) and Paleontological Resources with mitigation. • Cumulative impacts less than significant with mitigation.	• Less than significant impacts to Geologic Hazardous (ground shaking) and Paleontological Resources with mitigation. • Cumulative impacts less than significant with mitigation.	• Less than significant impacts to Geologic Hazardous (ground shaking) and Paleontological Resources with mitigation. • Cumulative impacts less than significant with mitigation.	• Less than significant impacts to Geologic Hazardous (ground shaking) and Paleontological Resources with mitigation. • Cumulative impacts less than significant with mitigation.	• No Impact
Power Plant Efficiency	• Less than significant	• Less than significant	• Less than significant	• Less than significant	• No Impact

Alternative	Proposed Project	Northern Unit	Southern Unit	Original Project	No Project/ No Action
	impacts to fossil fuel energy resources.	impacts to fossil fuel energy resources	impacts to fossil fuel energy resources	impacts to fossil fuel energy resources	
Power Plant Reliability	• Project operation and construction considered reliable.	• Project operation and construction considered reliable.	• Project operation and construction considered reliable.	• Project operation and construction considered reliable.	• No Impact
Transmission System Engineering	• Indirect transmission impacts cannot be determined at this time. Phase II Study and LGIA needed.	• Indirect transmission impacts cannot be determined at this time. Phase II Study and LGIA needed.	• Indirect transmission impacts cannot be determined at this time. Phase II Study and LGIA needed.	• Indirect transmission impacts cannot be determined at this time. Phase II Study and LGIA needed.	• No Impact

Impacts of a solar PV facility at the RSPP site would depend on the degree of grading required; reduced need for grading would reduce impacts to biological resources. Additionally, fencing may permit movement of desert tortoises. Less grading would also reduce cultural resource impacts. Impacts to water use during operations would be substantially reduced. Visual impacts would be reduced due to shorter components of a PV facility. Impacts to recreation and wilderness would be similar.

The Garlock Road site alternative is evaluated in detail by the Energy Commission in this SA/DPA/DEIS under CEQA only. While the impacts of this site would be similar to those of the proposed site in many disciplines, this site would likely have less severe biological and cultural impacts. The site is potentially available but flooding in the area may affect feasibility of locating a project at the Garlock Road site. Transmission interconnection may be difficult in that sensitive areas occur along the right of way. The four other alternative sites (Alabama Hills, Boron, California City and Ridgecrest Landfill) would not substantially reduce impacts and the feasibility of developing projects at these locations is reduced because of size limitations, past operations and private ownership.

All five site alternatives were considered infeasible by the Bureau of Land Management because they would not be reasonable based on the Purpose and Need Statement developed in response to the application received.

Alternative solar thermal technologies (solar power tower, Stirling dish, and linear Fresnel) were also evaluated. As compared with the proposed RSPP parabolic trough technology, these technologies would not substantially change the severity of biological resources and cultural resources impacts, although the land requirements vary among the technologies. Rooftop solar PV would require extensive acreage although it would

minimize the need for undisturbed or vacant land. However, increased deployment of rooftop solar PV faces challenges in manufacturing capacity, cost, and policy implementation.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) were also examined as possible alternatives to the proposed RSPP project. These technologies would either be infeasible at the scale of the RSPP project, or would not eliminate substantial adverse impacts caused by the RSPP project without creating their own substantial adverse impacts in other locations. A natural gas plant would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that could be served by the RSPP project. In addition, these programs would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements.

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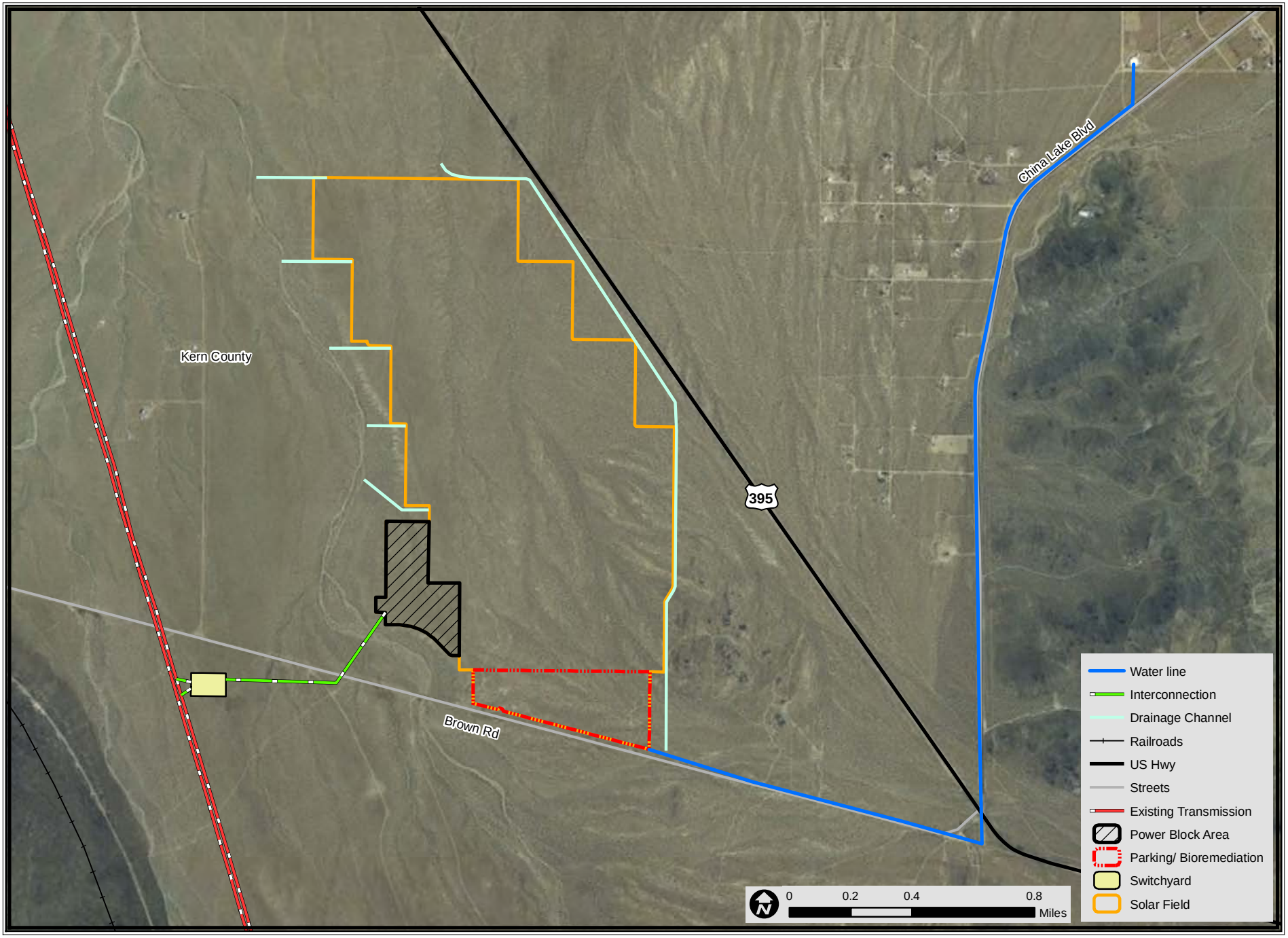
ALTERNATIVES FIGURE 1 - NORTHERN UNIT ALTERNATIVE

Ridgecrest Solar Power Project

MARCH 2010



ALTERNATIVES

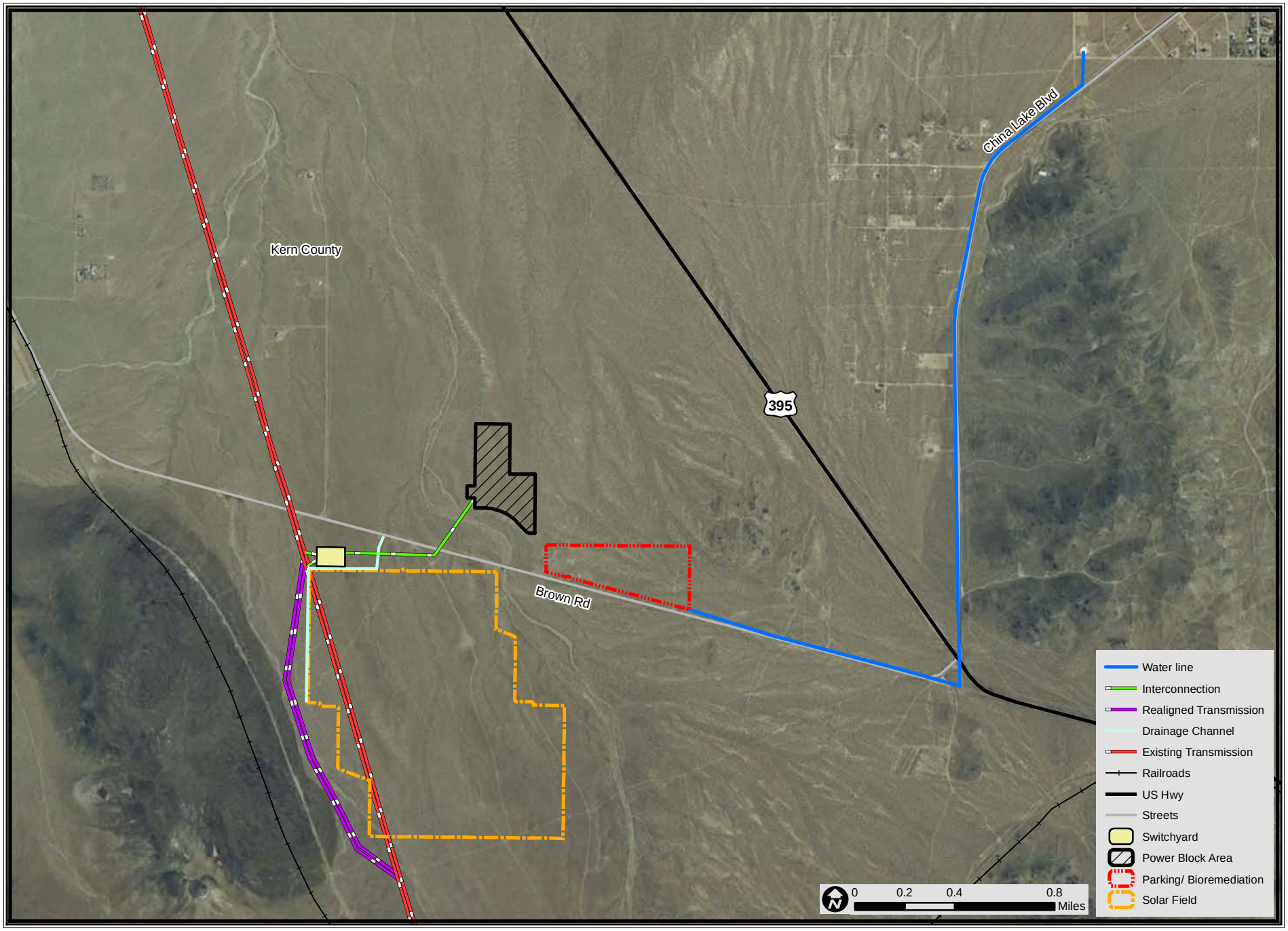
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE:California Energy Commission, Aspen, NAIP 2005

ALTERNATIVES FIGURE 2 - SOUTHERN UNIT ALTERNATIVE

Ridgecrest Solar Power Project

MARCH 2010



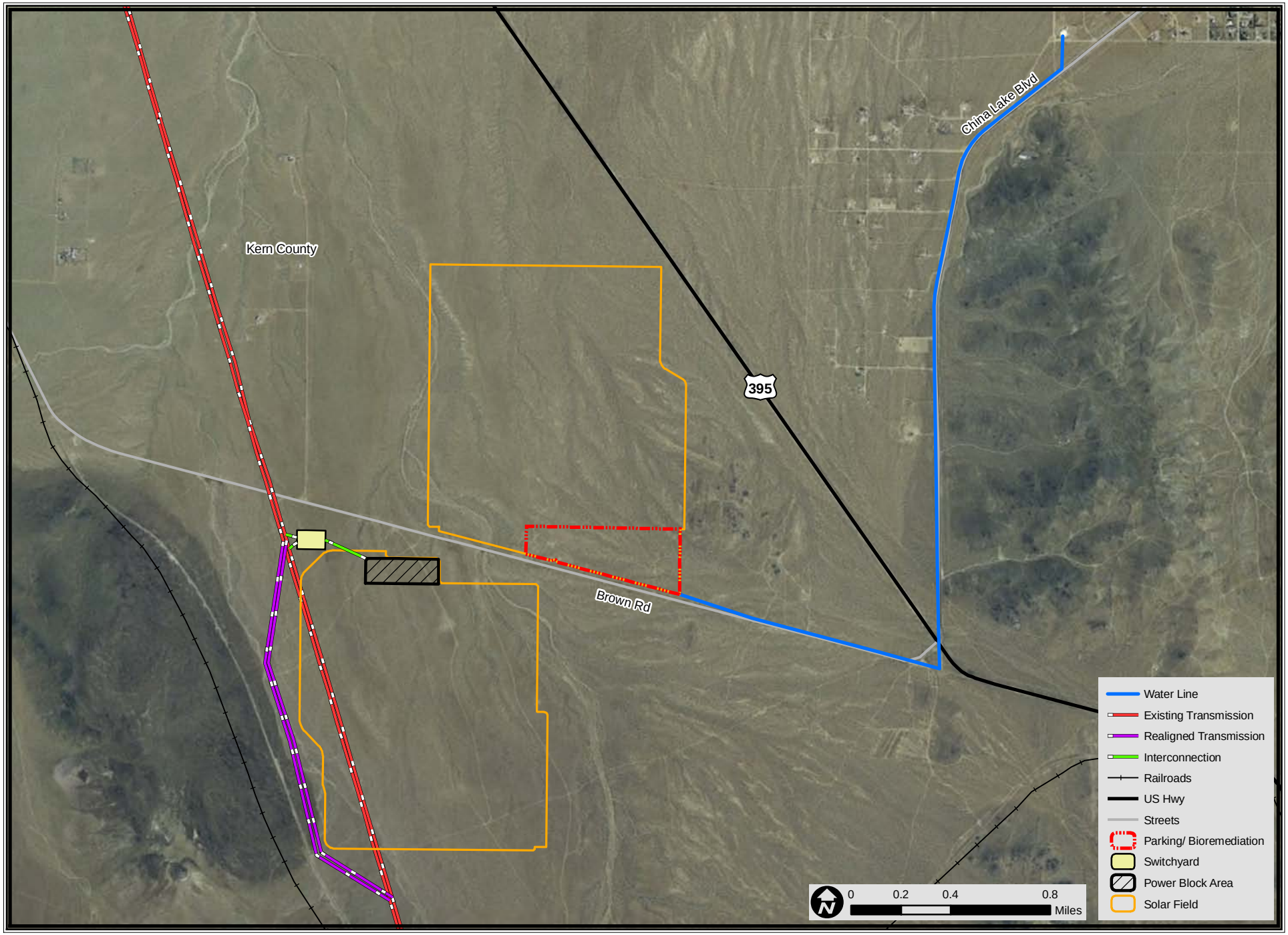
ALTERNATIVES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Aspen, NAIP 2005

ALTERNATIVES FIGURE 3 - ORIGINAL PROPOSED PROJECT ALTERNATIVE

Ridgecrest Solar Power Project



MARCH 2010

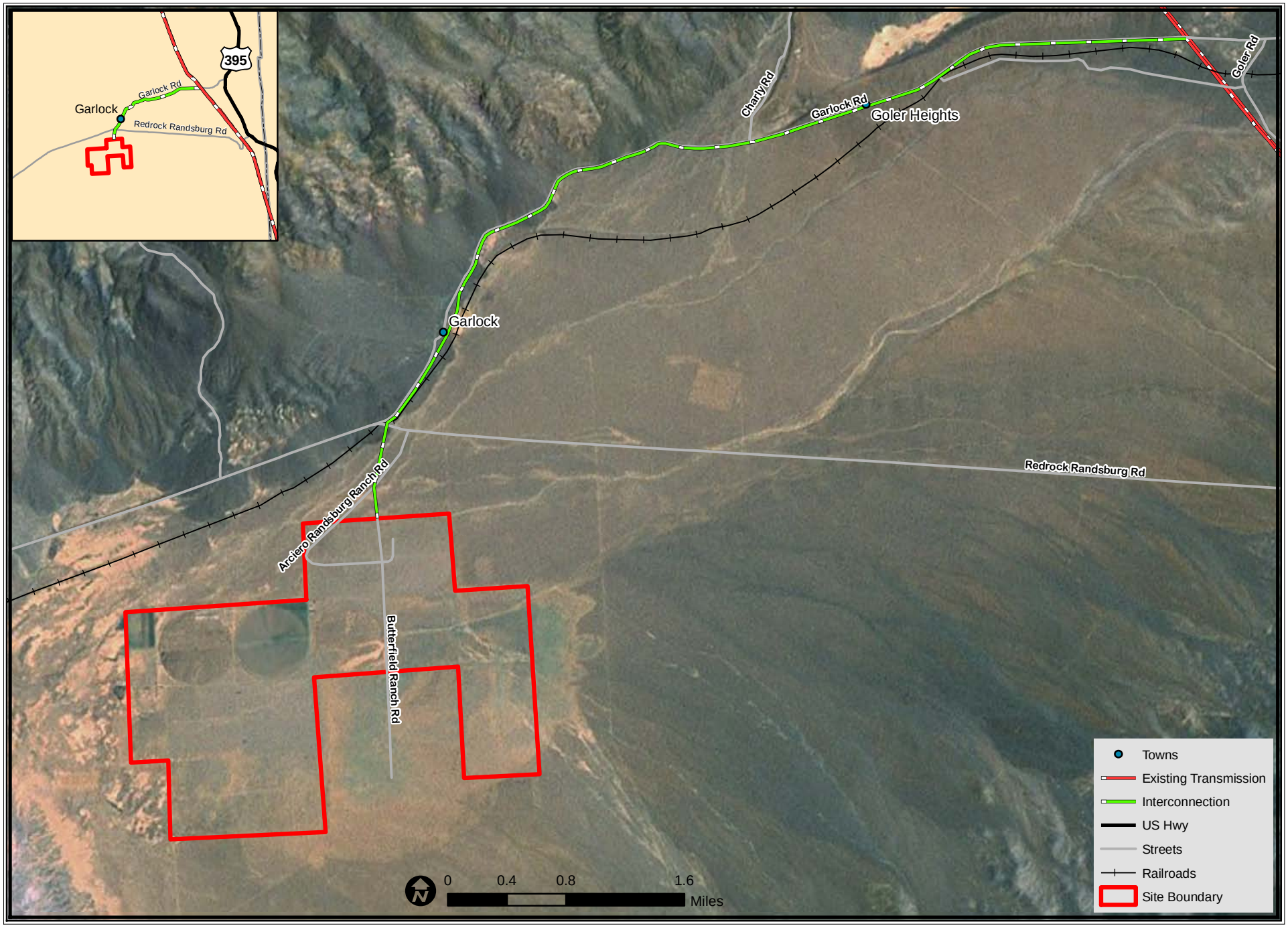
ALTERNATIVES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Aspen, NAIP 2005

ALTERNATIVES FIGURE 4 - GARLOCK ROAD ALTERNATIVE

Garlock Road Site



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Aspen, NAIP 2005

Alternatives Figure 5 - Solar PV Technologies - Utility Scale

Canon Solar Partners proposes to use the 35 kW Amonex system (Canon)

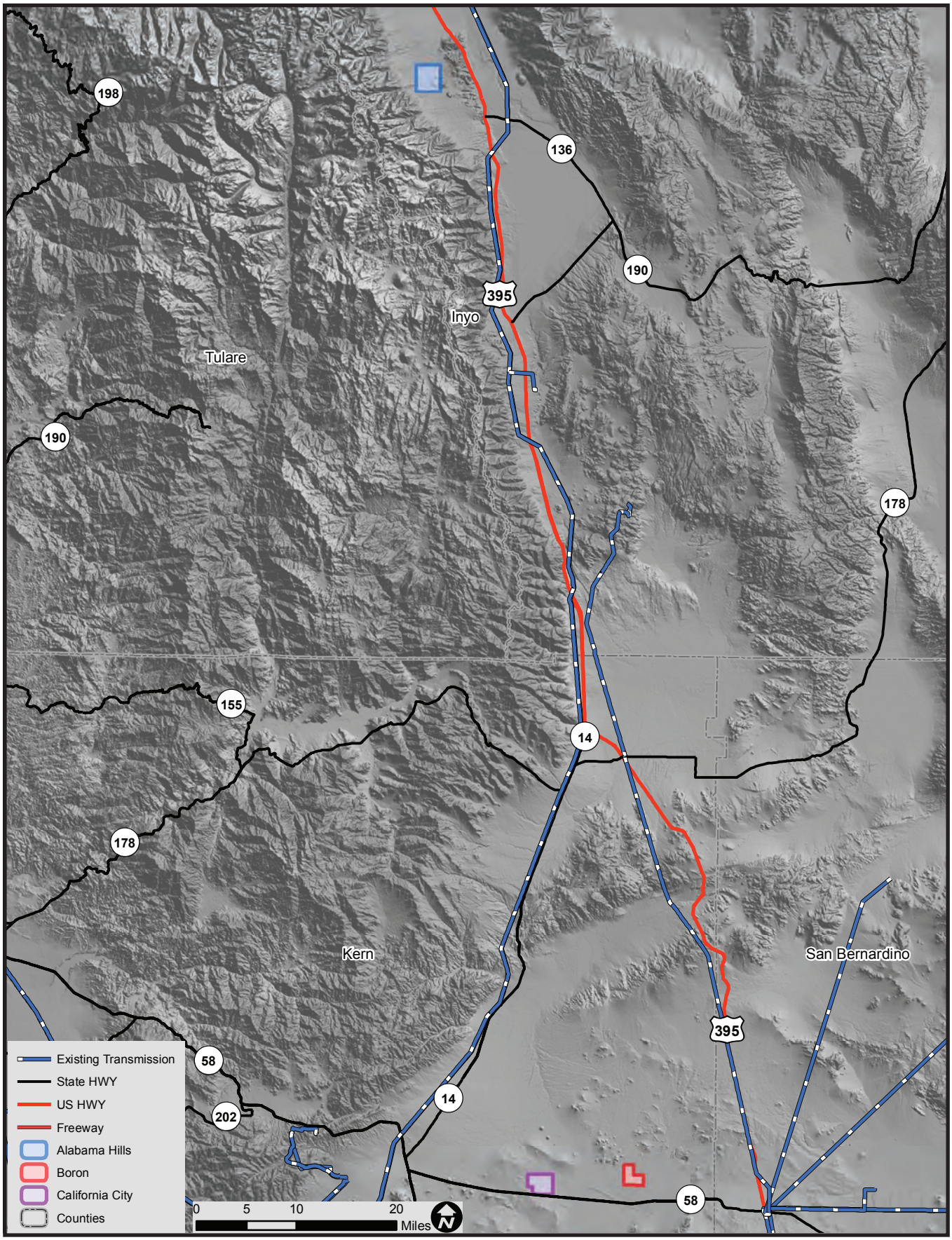
SunPower's PowerTracker Solar in Gwangju City Power Plant, South Korea - 1 MW
(http://www.sunpowercorp.com/For-Power-Plants.aspx)

Alternatives Figure 5 – Solar PV Technologies – Utility Scale

First Solar’s thin film solar photovoltaic field (Photo: Susan Lee)

ALTERNATIVES - FIGURE 6

Ridgecrest Solar Power Project - All Applicants Proposed Alternative Sites - Alabama Hills, Boron, California City Sites



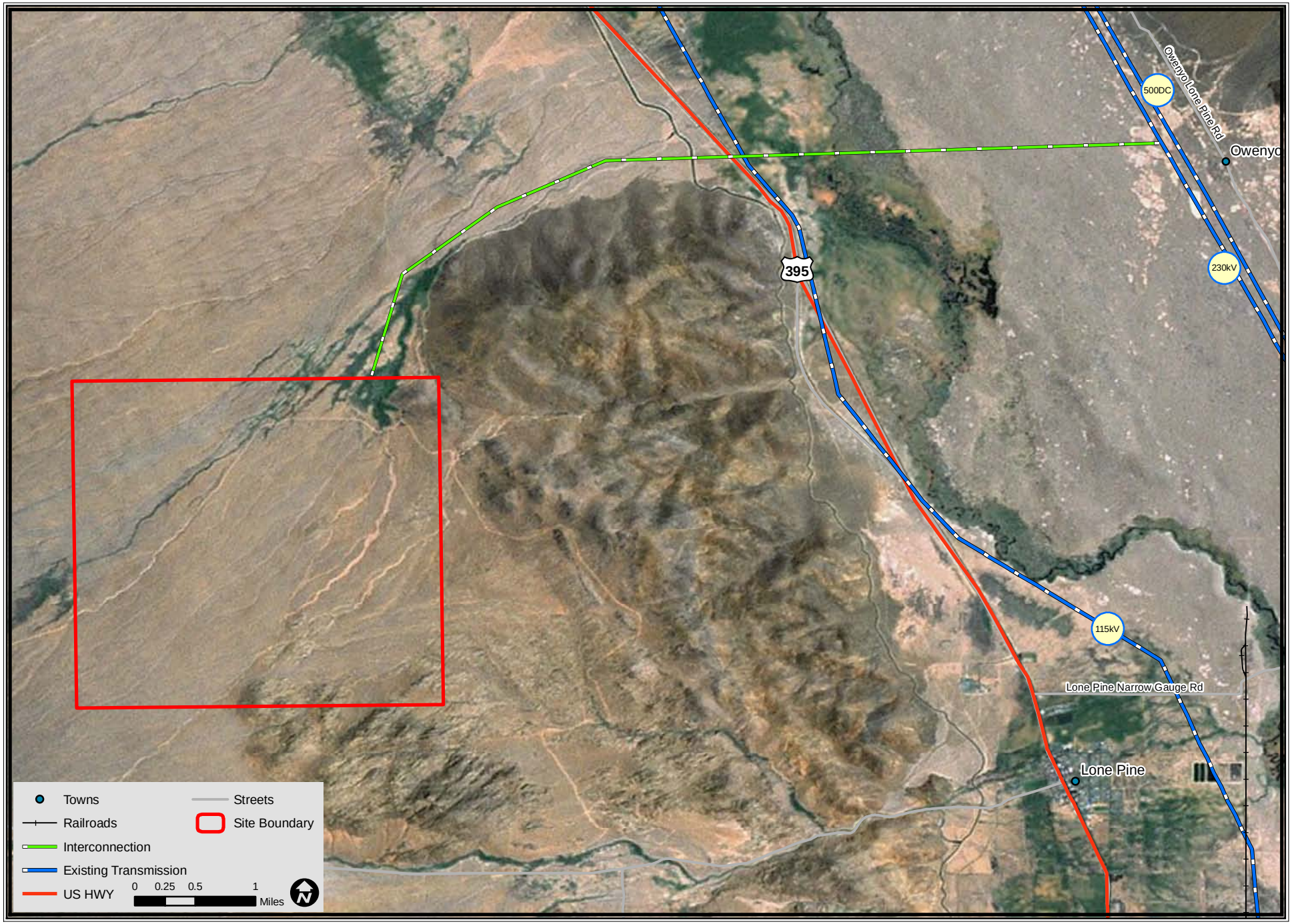
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Aspen, NAIP 2005

ALTERNATIVES FIGURE 7 - ALABAMA HILLS ALTERNATIVE

Alabama Hills Site

MARCH 2010



ALTERNATIVES

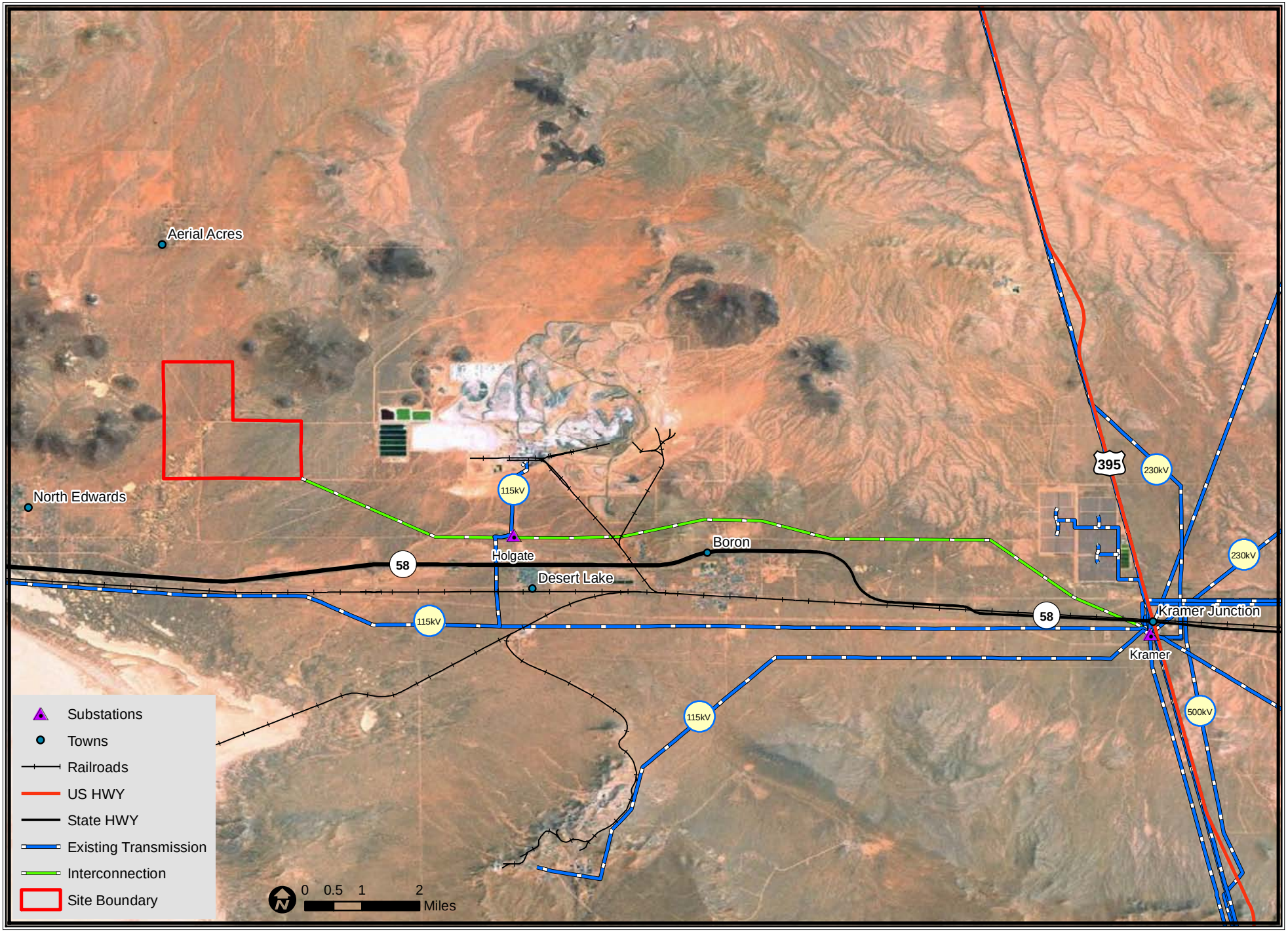
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Aspen, NAIP 2005

ALTERNATIVES FIGURE 8 - BORON ALTERNATIVE

Boron Site

MARCH 2010



ALTERNATIVES

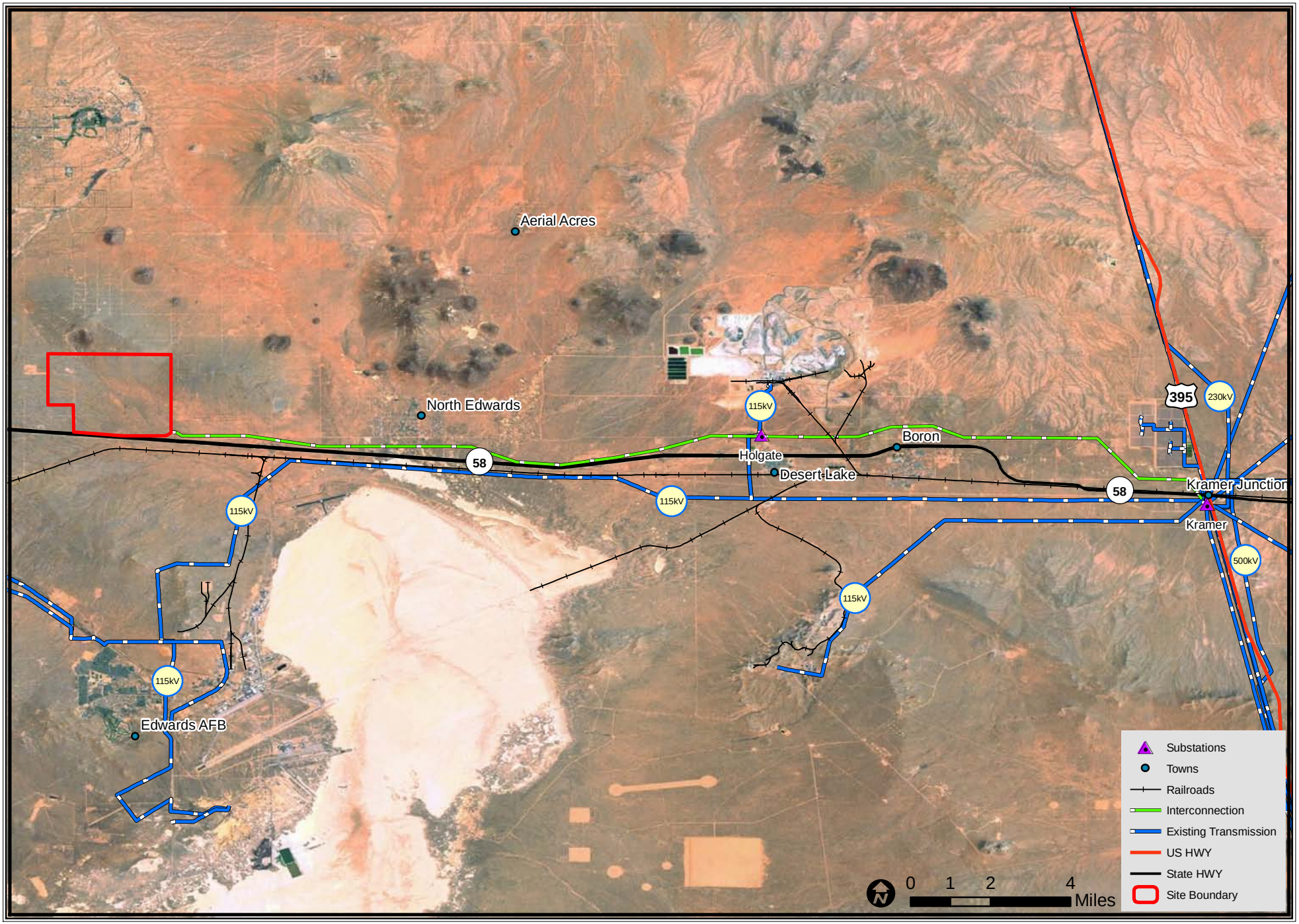
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Aspen, NAIP 2005

ALTERNATIVES FIGURE 9 - SOUTH OF CALIFORNIA CITY ALTERNATIVE

California City Site

MARCH 2010



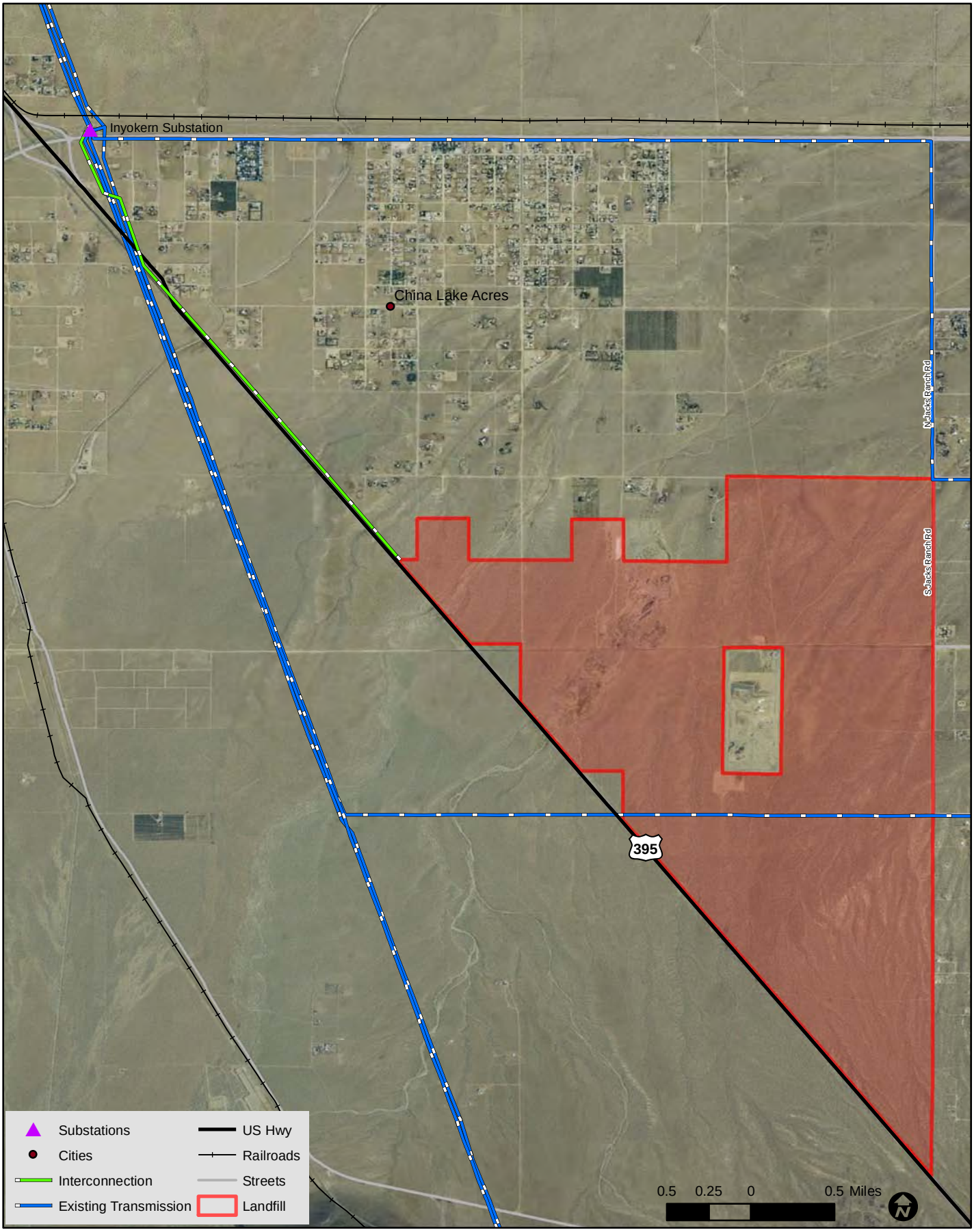
ALTERNATIVES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Aspen, NAIP 2005

ALTERNATIVES FIGURE 10 - RIDGECREST LANDFILL ALTERNATIVE

Ridgecrest Solar Power Project



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: Aspen, NAIP 2005

Alternatives Figure 11 – Strirling Dish, Solar Power Tower and Linear Fresnel Technologies

Stirling Dish Technology (www.solarcentral.org)

Solar Power Tower (from ISEGS PSA, 2008)

Linear Fresnel technology (Wikipedia.org, Fresnel_reflectors_ausra.jpg)

B.3 CUMULATIVE SCENARIO

Testimony of Suzanne Phinney, D.Env.

B.3.1 INTRODUCTION

Preparation of a cumulative impact analysis is required under both CEQA and NEPA. "Cumulative impact" is the impact on the environment which results from the incremental impact of the Proposed Project when considered with other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR §1508.7).

Under CEQA Guidelines, "a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts" (14 Cal Code Regs §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is "cumulatively considerable" (14 Cal Code Regs §15130(a)). Such incremental effects are to be "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects" (14 Cal Code Regs §15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

CEQA also states that both the severity of impacts and the likelihood of their occurrence are to be reflected in the discussion, "but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion of cumulative impacts shall be guided by standards of practicality and reasonableness, and shall focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact" (14 Cal Code Regs §15130(b)).

NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7). Under NEPA, both context and intensity are considered. When considering intensity of an effect, we consider "[w]hether the action is related to other actions with individually minor but cumulatively significant impacts. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts." 40 CFR §1508.27(b)(7).

The intensity, or severity, of the cumulative effects should consider the magnitude, geographic extent, duration and frequency of the effects (CEQ, 1997). The magnitude of the effect reflects the relative size or amount of the effect; the geographic extent considers how widespread the effect may be; and the duration and frequency refer to whether the effect is a one-time event, intermittent, or chronic (CEQ, 1997).

B.3.2 RENEWABLE PROJECT BACKGROUND

A large number of renewable projects have been proposed on BLM managed land, State land, and private land in California. As of January 2010, there were 244 renewable projects proposed in California in various stages of the environmental review process or under construction. As of January 2010, *48* of these projects, representing

approximately 10,900MW, were planning on requesting American Recovery and Reinvestment Act funds from the Federal government. Solar, wind, and geothermal development applications have requested use of BLM land, including approximately one million acres of the California desert. State and private lands have also been targeted for renewable solar and wind projects.

A number of existing policies and incentives encourage renewable energy development. These incentives lead to a greater number of renewable energy proposals. Example of incentives for developers to propose renewable energy projects on private and public lands in California, include the following:

- **U.S. Treasury Department's Payments for Specified Energy Property in Lieu of Tax Credits** under §1603 of the American Recovery and Reinvestment Act of 2009 (Public Law 111-5) - Offers a grant (in lieu of investment tax credit) to receive funding for 30% of their total capital cost at such time as a project achieves commercial operation (currently applies to projects that begin construction by December 31, 2010 and begin commercial operation before January 1, 2017).
- **U.S. Department of Energy (DOE) Loan Guarantee Program** pursuant to §1703 of Title XVII of the Energy Policy Act of 2005 - Offers a loan guarantee that is also a low interest loan to finance up to 80% of the capital cost at an interest rate much lower than conventional financing. The lower interest rate can reduce the cost of financing and the gross project cost on the order of several hundred million dollars over the life of the project, depending on the capital cost of the project.

The large renewable projects now described in applications to the BLM and on private land are competing for utility Power Purchase Agreements, which will allow utilities to meet state-required Renewable Portfolio Standards. Not all projects will complete the environmental review, and not all projects will be funded and constructed. It is unlikely that all of these projects will be constructed for the following reasons:

- Not all developers will develop the detailed information necessary to meet BLM and Energy Commission standards. Most of the solar projects with pending applications are proposing generation technologies that have not been implemented at large scales. As a result, preparing complete and detailed plans of development (PODs) is difficult, and completing the required NEPA and CEQA documents is especially time-consuming and costly.
- As part of approval by the appropriate Lead Agency under CEQA and/or NEPA (generally the Energy Commission and/or BLM), all regulatory permits must be obtained by the applicant or the prescriptions required by the regulatory authorities incorporated into the Lead Agency’s license, permit or right-of-way grant. The large size of these projects may result in permitting challenges related to endangered species, mitigation measures or requirements, and other issues.
- Also after project approval, construction financing must be obtained (if it has not been obtained earlier in the process). The availability of financing will be dependent on the status of competing projects, the laws and regulations related to renewable project investment, the ability to qualify for renewable energy incentives offered by the federal government and the time required for obtaining permits.

B.3.3 CUMULATIVE SCENARIO

Cumulative impacts analysis is intended to highlight past actions that are closely related either in time or location to the project being considered, catalogue past projects and discuss how they have harmed the environment, and discuss past actions even if they were undertaken by another agency or another person. Most of the renewable projects proposed in California have, are, or will be required to undergo their own independent environmental review under either CEQA or NEPA.

Under CEQA, there are two acceptable and commonly used methodologies for establishing the cumulative impact setting or scenario: the "list approach" and the "projections approach". The first approach would use a "list of past, present, and probable future projects producing related or cumulative impacts." 14 Cal Code Regs §15130(b)(1)(A). The second approach is to use a "summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact" (14 Cal Code Regs §15130(b)(1)(B)). This SA/EIS uses the "list approach" for purposes of state law to provide a tangible understanding and context for analyzing the potential cumulative effects of a Project.

Under NEPA, an EIS must provide a sufficiently detailed catalogue of past, present, and reasonably foreseeable future projects, and provide an adequate analysis of how these projects, in conjunction with the proposed action, are thought to have impacted or are expected to impact the environment. While NEPA requires an adequate cataloging of past projects, it also requires a discussion of consequences of those past projects. NEPA is designed to inform decision making and through disclosure of relevant environmental considerations, permit informed public comment.

In order to provide a basis for cumulative analysis for each discipline, this section provides information on other projects in both tables and maps. The Energy Commission and the BLM have identified the California desert as the largest area within which cumulative effects should be assessed for all disciplines, as listed in three tables and shown on accompanying maps. However, within the desert region, the specific area of cumulative effect varies by resource. For this reason, each discipline has identified the geographic scope for the discipline's analysis of cumulative impacts. Information on projects within the California desert is provided in the following tables and figures:

- **Cumulative Impacts Table 1A** lists renewable energy projects on BLM land in the California Desert District as defined by BLM.
- **Cumulative Impacts Table 1B** lists renewable energy projects on State and local lands in the California desert that have requested ARRA funding.
- **Cumulative Impacts Figure 1** shows the general location of BLM lease applications within the California Desert District.
- **Cumulative Impacts Figure 2** shows the location of BLM lease applications within the Ridgecrest District office.

All tables and figures are presented at the end of this section.

B.3.4 APPROACH TO CUMULATIVE IMPACT ANALYSIS

This Staff Assessment/Draft EIS evaluates cumulative impacts within the analysis of each resource area, following these steps:

1. Define the geographic scope of cumulative impact analysis for each discipline, based on the potential area within which impacts of the Ridgecrest Solar Power project could combine with those of other projects.

2. Evaluate the effects of the Ridgecrest Solar Power project in combination with past and present (existing) projects within the area of geographic effect defined for each discipline.

3. Evaluate the effects of the Ridgecrest Solar Power project with foreseeable future projects that occur within the area of geographic effect defined for each discipline.

Each of these steps is described below.

GEOGRAPHIC SCOPE OF CUMULATIVE ANALYSIS

The area of cumulative effect varies by resource. For example, air quality impacts tend to disperse over a large area, while traffic impacts are typically more localized. For this reason, the geographic scope for the analysis of cumulative impacts must be identified for each resource area.

The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resource being evaluated. The geographic scope of each analysis is based on the topography surrounding the Ridgecrest Solar Power project and the natural boundaries of the resource affected, rather than jurisdictional boundaries. The geographic scope of cumulative effects will often extend beyond the scope of the direct effects, but not beyond the scope of the direct and indirect effects of the proposed action and alternatives.

In addition, each project in a region will have its own implementation schedule, which may or may not coincide or overlap with the Ridgecrest Solar Power project's schedule. This is a consideration for short-term impacts from the Ridgecrest Solar Power project. However, despite the previous discussion of factors that could limit development, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the Ridgecrest Solar Power project.

PROJECT EFFECTS IN COMBINATION WITH FORESEEABLE FUTURE PROJECTS

Each discipline evaluates the impacts of the proposed project in light of the current baseline - the past, present (existing) and future projects near the Ridgecrest Solar Power plant site. **Cumulative Impacts Table 2** lists the existing projects located in the Ridgecrest area - an approximate 15 to 20-mile radius around the project site. **Cumulative Impacts Table 3** lists the future/foreseeable projects in this area. Both tables indicate project name, type, location, and status. **Cumulative Impacts Figure 3**

shows the locations of the existing and future/foreseeable projects in the Ridgecrest area. The city of Ridgecrest is currently experiencing significant hotel construction; however these projects are expected to be completed in early to mid-2010 prior to the potential start date of Ridgecrest Solar Power project, and therefore were not included in this analysis (AECOM 2009).

Reasonably foreseeable projects that could contribute to the cumulative effects scenario depend on the extent of resource effects, but could include projects in the immediate Ridgecrest City area as well as other large renewable projects in Inyo, Kern, San Bernardino, Los Angeles, Riverside, San Diego, Orange and Imperial Counties that are in closest proximity to the BLM Ridgecrest District. These projects are illustrated in **Cumulative Impacts Table 1A** and **1B** and **Cumulative Impacts Figures 1** and **2**. Solar and wind development applications for use of BLM land have been submitted for approximately 156,000 acres of the land in Kern, Inyo and San Bernardino Counties (roughly corresponding with the BLM's Ridgecrest Field Office) of the California Desert Conservation Area. Corresponding acreage for solar, wind and geothermal applications on state and private land submitted in Inyo, Kern, San Bernardino, Los Angeles, Riverside, San Diego, Orange and Imperial Counties is not available. However, the projects listed in Cumulative Impacts Table 1B would generate approximately 4,435 MW.

As shown in **Cumulative Impacts Tables 2** and **3** and **Cumulative Impacts Figure 3,** there are several existing and proposed projects in the area around the city of Ridgecrest whose impacts could combine with those of the proposed Ridgecrest Solar Power project.

The data presented in the tables and figures is considered in the analysis of each discipline.

Cumulative Scenario Table 1A
Renewable Energy Projects in the BLM California Desert District

BLM Field Office	Number of Projects & Acres	Total MW
Solar Energy		
Ridgecrest Field Office	• 5 projects • 32,463 acres	• 3,135 MW
Barstow Field Office	• 18 projects • 132,560 acres	• 12,875 MW
Needles Field Office	• 17 projects • 230,480 acres	• 15,700 MW
Palm Springs Field Office	• 17 projects • 123,592 acres	• 11,873 MW
El Centro Field Office	• 7 projects • 50,707 acres	• 3,950 MW
TOTAL	• **64 projects** • **569,802 acres**	• **47,533 MW**
Wind Energy		
Bakersfield Field Office - Central District, borders CDD in Kern County	• 1 project • 200 acres	• n/a
Ridgecrest Field Office	• 16 projects • 123,379 acres	• n/a
Barstow Field Office	• 25 projects • 171,560 acres	• n/a
Needles Field Office	• 8 projects • 115,233 acres	• n/a
Palm Springs Field Office	• 4 projects • 5,851 acres	• n/a
El Centro Field Office	• 9 projects (acreage not given for 3 of the projects) • 48,001 acres	• n/a
TOTAL	• **63 projects** • **464,224 acres**	• n/a

Source: Renewable Energy Projects in the California Desert Conservation Area identifies solar and wind renewable projects as listed on the BLM California Desert District Alternative Energy Website (BLM 2009)
n/a = MW not available

Cumulative Scenario Table 1B
Renewable Energy Projects on State and Private Lands
In California Desert District Counties

Project Name	Location	MW
Solar Projects		
Maricopa Sun Solar Complex (Solar PV)	Kern County	350
Antelope Valley Solar Ranch One	Loa Angeles and Kern Counties	230
Gray Butte Solar PV (Solar PV)	Los Angeles County	150
Monte Vista (Solar PV)	Kern County	126
NRG Alpine Suntower (Solar PV and Solar thermal)	Los Angeles County	86
Palmdale Hybrid Power Project Unit 1 (Solar thermal, part of a hybrid project)	Los Angeles County	50
Lucerne Valley Solar (Solar PV)	San Bernardino County	45
Lost Hills (Solar PV)	Kern County	32.5
Tehachapi Photovoltaic Project (Solar PV)	Kern County	20
Boulevard Associates (Solar PV)	San Bernardino County	20
T, squared, Inc. (Solar PV)	Kern County	19
Man-Wei Solar (solar PV)	Kern County	n/a
Regenesis Power for Kern County Airports Dept.	Kern County	n/a
Abengoa Mojave Solar Project (250 MW solar thermal)	San Bernardino County	250
Rice Solar Energy Project (Solar thermal)	Riverside County	150
3 MW solar PV energy generating facility	San Bernardino County,	3
Blythe Airport Solar 1 Project (Solar PV)	Riverside County	100
First Solar's Blythe (Solar PV)	Riverside County	21
LADWP and OptiSolar Power Plant (Solar PV)	Imperial County,	68
AV Solar Ranch One (Solar PV)	Los Angeles County	230
Bethel Solar Hybrid Power Plant (Hybrid solar thermal and biomass)	Imperial County	49.4
Mt. Signal Solar Power Station (Hybrid solar thermal and biomass)	Imperial County	49.4
Wind Projects		
Alta-Oak Creek Mojave Project	Kern County	800
Pacific Wind	Kern County	300

Project Name	Location	MW
City of Vernon Wind Energy Project	Kern County	300
Manzana Wind Project	Kern County	300
Iberdrola Tule Wind	San Diego County	200
Pine Canyon	Kern County	150
Windstar 1	Kern County	120
AES Daggett Ridge	San Bernardino County	84
Granite Wind, LLC	San Bernardino County	81
Geothermal Projects		
Orni 18, LLC Geothermal Power Plant	Imperial County	49.9
Black Rock Geothermal 1,2,and 3	Imperial County	n/a

* This list is compiled from the projects on CEQAnet as of November 2009 and the projects located on private or State lands that are listed on the Energy Commission Renewable Action Team website as requesting ARRA funding. Additional renewable projects proposed on private and State lands but not requesting ARRA funds are listed on the website.
Source: CEQAnet [http://www.ceqanet.ca.gov/ProjectList.asp], November 2009 and CEC Renewable Action Team – Generation Tracking for ARRA Projects 12/29/2009 [http://www.energy.ca.gov/33by2020/documents/2009-12-29/2009-12-29_Proposed_ARRA_Renewable_Projects.pdf]

Cumulative Scenario Table 2
Existing Projects in the Ridgecrest Area

ID #	Project Name	Location	Agency/Owner	Status	Project Description
1	China Lake Naval Weapons Center	Western Mojave Desert (immediately North of Ridgecrest site)	U.S. Navy	Existing	The China Lake Naval Air Weapons Station is an airborne weapons testing and training facility. China Lake NAWS employs 1,000 military personnel on the base and 5,900 civilian and contract employees. It covers 1.1 million acres of land to the north of the Ridgecrest project site and is immediately west of the city of Ridgecrest (NAWS China Lake, 2009)

Cumulative Scenario Table 3
Future Forseeable Projects in the Ridgecrest Area

ID #	Project Name	Location	Agency/Owner	Status	Project Description
A	City of Ridgecrest New Waste Water Treatment Plant	To Be Determined, within the City of Ridgecrest	City of Ridgecrest	Request For Qualifications released October 2009	The City of Ridgecrest plans to construct a new WWTP to deal with foreseeable population growth (City of Ridgecrest 2009).
B	China Lake Naval Weapons Air Center Base Realignment and Closure	Western Mojave Desert (immediately North of Ridgecrest site)	U.S. Navy	Final EIR published 2004	The Base Realignment and Closure (BRAC) plan proposes to increase testing and training operations at the base by combining several bases throughout the country. (NAWS China Lake, 2009) The BRAC is anticipated to create 4,085 new jobs and potentially 2700 new homes to accommodate growth (AECOM 2009).
C	Super Wal-Mart	Near the intersection of South China Lake Boulevard and East Bowman Road(5 miles northeast of project site)	Wal-Mart	Final EIR published September2009.	A new super Wal-Mart including a fueling station and two vacant parcels for potential developed in the future. The proposed project footprint is 28.5 acres. Bowman Road will be widened from South China Lake Boulevard to Sunland Street, two new roads will be constructed and a portion of Bowman Road will be paved (City of Ridgecrest 2009).
D	Freeman Gulch Four-Lane Project	State Route 14 in Kern County from 0.8 mile north of Redrock Inyokern Road to 2.2 miles south of the junction with U.S. Highway 395.	California Department of Transportation	Construction to start in 2012 - 2015	Caltrans proposes to convert the existing two-lane conventional highway into a four-lane, divided, controlled-access expressway (Cal Trans 2009, Kern County 2009).
E	Inyokern Four-Lane Project	U.S. Highway 395 from 1.1 miles south of South China Lake Boulevard to 1 mile north of State Route 14	California Department of Transportation	Cal Trans anticipates approval of the Mitigated Negative Declaration and Environmental Assessment in October 2010. No start date has been established.	Cal Trans proposes to widen approximately 15.5 miles of the existing U.S. Highway 395. The project will convert the 2 lane highway into a 4 lane expressway (Cal Trans 2009).

ID #	Project Name	Location	Agency/Owner	Status	Project Description
F	Solar Project - CACA 49511	Ridgecrest- (northeast of project site)	First Solar	Application submitted 11/07; cost recovery funds recorded, advised to re-establish application in 11/08.	7,183 acre 600 MW photovoltaic solar plant (BLM 2009).
G	Wind Project – CACA 050020	West side of Highway 395 (immediately west and south of Ridgecrest site)	Brewer Energy Co.	New application; Native American Consultation.	3,200 acre wind project, 3 towers (BLM 2009).
H	Wind Project – CACA 048948	Rand Mountain area- (approximately 3 miles south of Ridgecrest site)	Renewergy, LLC	Initial application incomplete, EA required.	14,209 acre wind project at Laurel and El Paso Peaks in the city of Ridgecrest (BLM 2009).
I	Wind Project – CACA 050319	Searles Hills, crosses Highway 395- (approximately 7 miles south east of Ridgecrest site)	Debenham Energy, LLC	New application; Native American Consultation	8,096 acre wind project, 8 towers, 2 rights of way (BLM 2009).

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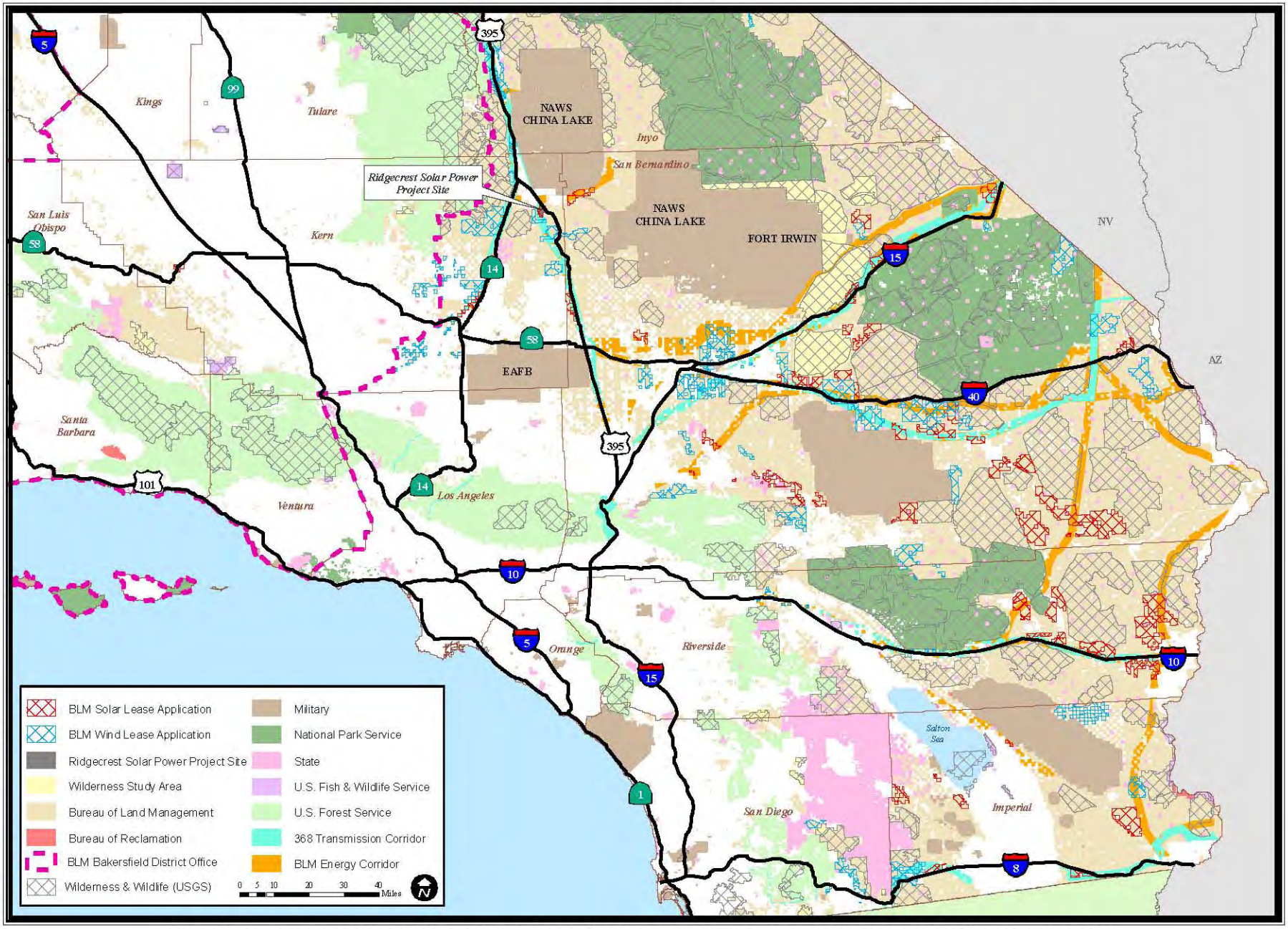
MARCH 2010

CUMULATIVE IMPACTS - FIGURE 1

Ridgecrest Solar Power Project - Renewable Energy Applications in the California Desert District



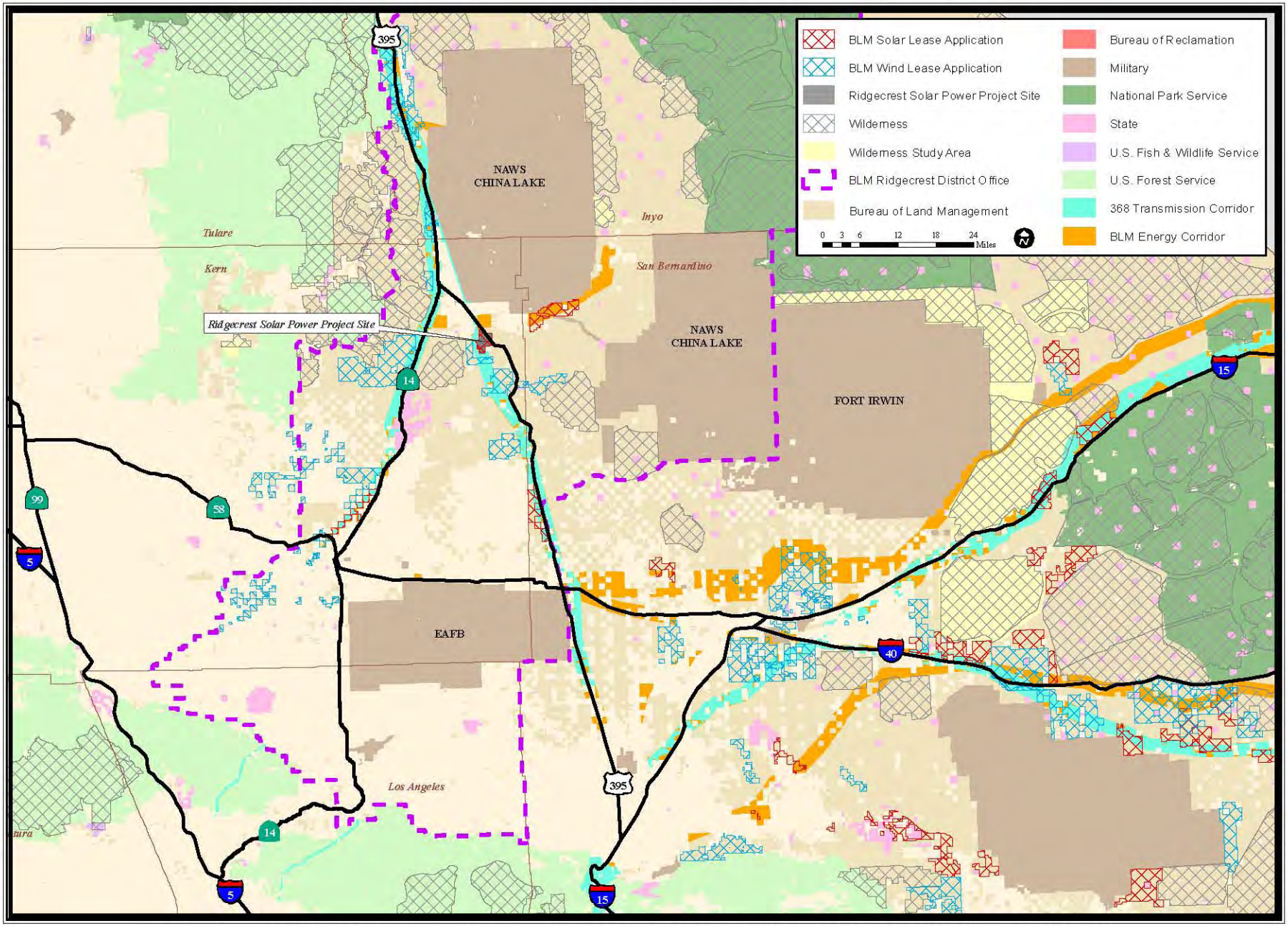
CUMULATIVE IMPACTS

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Bureau of Land Management

CUMULATIVE IMPACTS - FIGURE 2

Ridgecrest Solar Power Project - Renewable Energy Applications in the Ridgecrest District Area

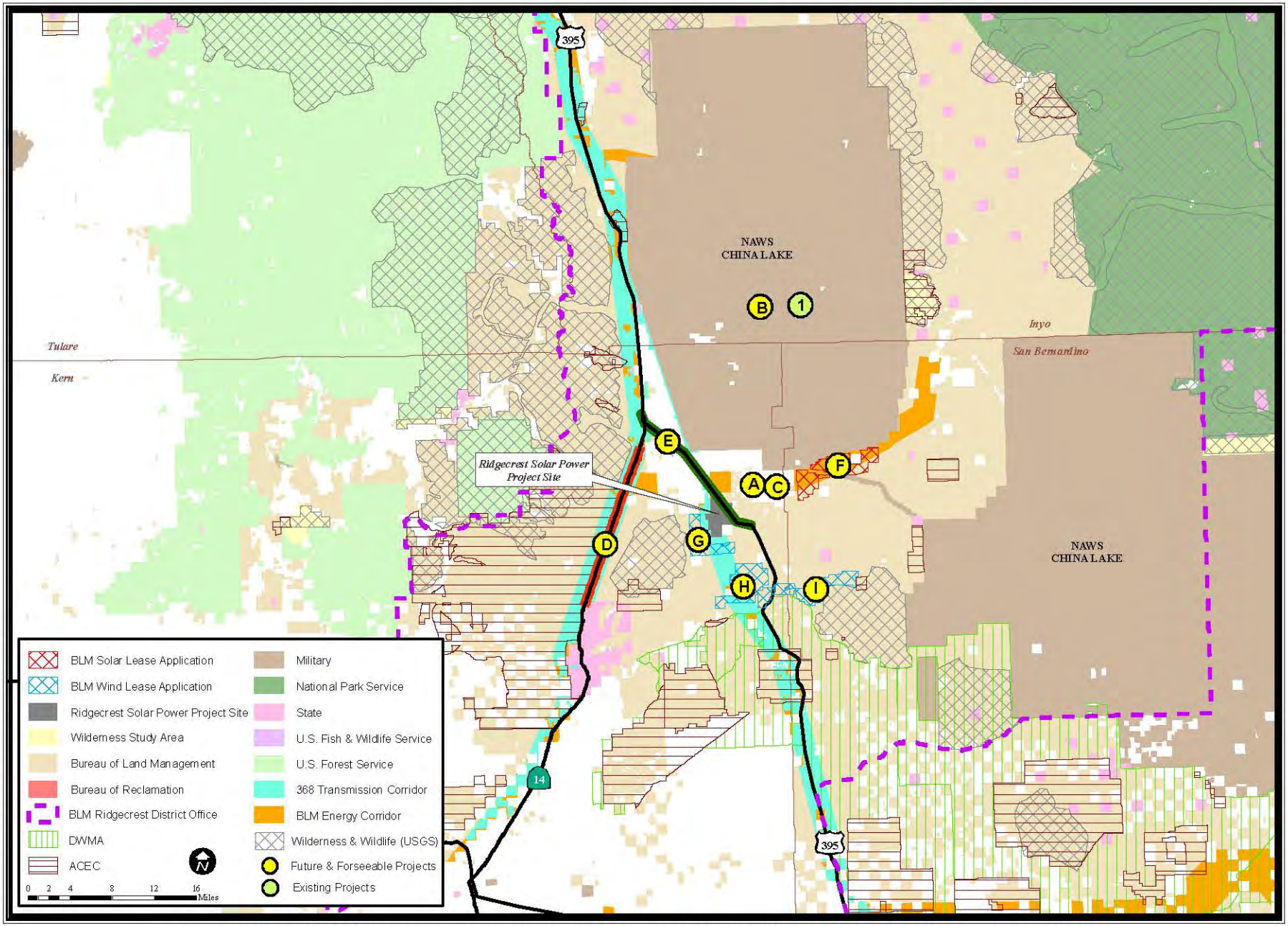


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Bureau of Land Management

CUMULATIVE IMPACTS - FIGURE 3

Ridgecrest Solar Power Project - Existing and Future/Forseeable Projects in the Ridgecrest Area



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Bureau of Land Management